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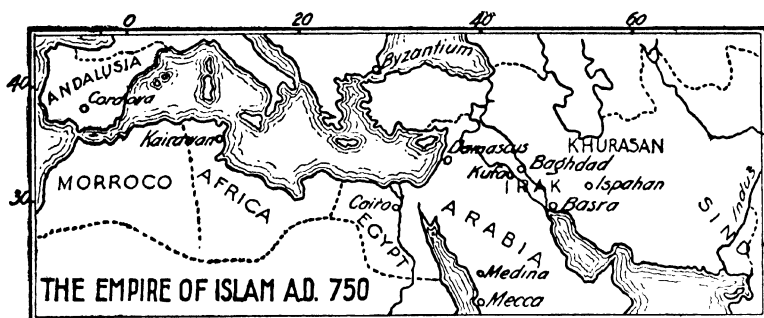
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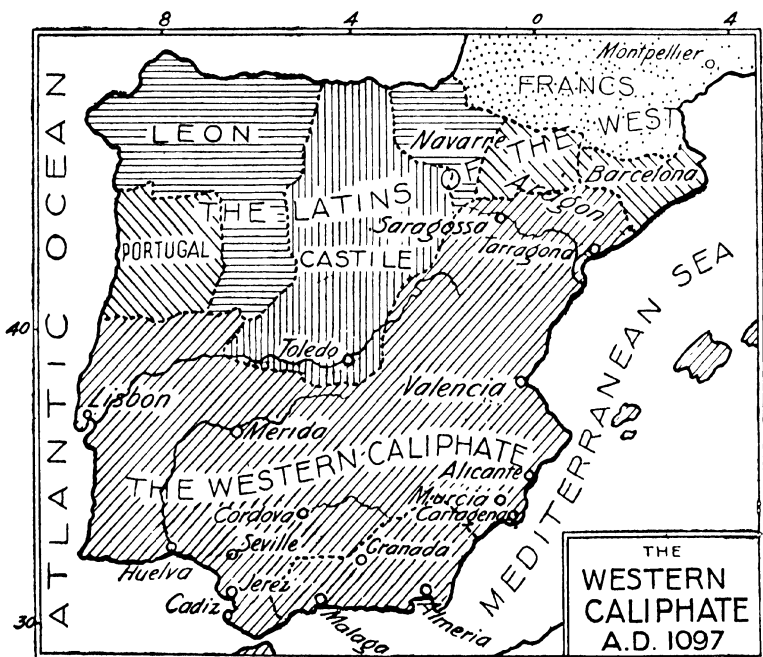
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Map 1 is an outline sketch (on Mercator's Projection) of the Empire of Islam in the year A.D. 750, and illustrates the wide extent of the territories under the sway of the Caliphs of Islam, during the age of Arabian rumours in the Latin West.



Map 2 illustrates the territorial relationship between the Latin scholars of the West of Europe and the Arabic Caliphate of the West in the year A.D. 1097. The position of Toledo, surrounded as it was on three sides by Moslem territory, will be noted, as it was of first importance in the transference of Arabic Medicine to the Latin West.

ARABIAN MEDICINE

AND ITS INFLUENCE ON THE
MIDDLE AGES

BY

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PREFACE BY THE AUTHOR

IN these pages I have attempted to place before the reader the origin and development of Arabian Medicine and its subsequent cultivation among the *Arabistae* of the Latin west. The material used by me has been fully credited both in the body of the work, the footnotes and in the bibliography, and where I have inadvertently omitted the name of any of the "giants" whose writings I have studied, and to whom I owe a debt of gratitude, I here beg to offer my apologies.

In the latter half of this volume, I have treated on Mediaeval Medicine, which is but a modification of Arabian Medicine as understood by the scholastics who based their systems on what are shown to be indifferent Latin versions of the Arabic writings of Islam, which in turn were versions of the Syriac translations of the Greek texts. The period treated of in this work is considered both one of the most important and most difficult of historical studies, so that it is my sincere hope that this small contribution of mine to the study of this interesting subject will not be judged too harshly, but that this effort which constitutes the first attempt to compile such a work in the English language, will prove not only of interest, but of value, to those who propose to take a journey down the dim corridors of the past in order to mingle with the monks, knights, and arabists who are our intellectual forbears.

That I was able to compile these two volumes is due to my "supervisor" Dr. Charles Singer, whose guidance and assistance has been the means of placing me on the rails of original research.

PREFATORY NOTE

THE romantic history of the rise and efflorescence of Arabian Medicine which finds its roots in Hellenistic culture, is more than a historical curiosity. With the decline of the Graeco-Roman civilization, the movement of culture-drift was eastward, passing through the hands of the Syriac scholars of Asia Minor, the torch of classical culture distorted though it was in the light of Islamitic teaching was carried by the Arabic scholars who added to it all that was not in conflict with the religious tenets of Mahomet in the writings of the East.

It is necessary to point out that the term Arabian Medicine must be understood as synonymous with Arabic Medicine, as the language of the learned in the Empire of Islam was Arabic, just as Latin was the linguistic medium of the educated in Western Europe. Further, the term Arabian does not necessarily imply an Arab, for the Persians and Nestorians in the East, and the Spaniards and Jews in the West, took the principal part in the development of medicine which was expressed in the Arabic language during the dominancy of the Empire of Islam: the only prominent Arabic writer of pure Arab stock was *al-Kindi*, who was known to the European scholastics as Alkindus. The subject races of Islam adopted Arabic in furtherance of their national aims; this is well exemplified in the work of Joseph Saadiah (892-941), who was head of the Talmudic school at Sura near Babylon; the Rabbi who was the first to attempt a scientific Hebrew grammar, wrote in Arabic.

With the expansion of the territories of Islam into Europe, the seventh to the twelfth centuries saw Islam and Christendom in intimate contact in Spain and Sicily, which were the two principal points from which the Latin West drew on Graeco-Arabic Medicine. After the fall of Syracuse (in Sicily) into the hands of the Arabians in A.D. 878, Sicily became a seat of Arabic culture until the year 1061, when the Normans under Guiscard and Roger, sons of Tancred, began the conquest of the island, completing it in 1091. It was not until the twelfth century that the "Kingdom of the two Sicilies" came into existence, and passing through a chequered page in history, it finally disappeared in the year 1861, when it was joined to the Kingdom of Italy, as a result of the laying down of the dictatorship by Garibaldi.

Of the Spanish centre of Arabic culture, Cordova was the principal seat, while Toledo, which was captured by the Christians in A.D. 1085, had a College of Translators founded there by the Archbishop Raymond; this College became the most important centre for the transference of Arabic Culture to the Latin West. The main body of the Latin translations were indifferently executed owing to the method adopted; the Latin equivalent was placed over the Arabic, and where the translator was at a loss for the correct Latin interpretation, the Arabic was transcribed bodily, with the result that such terms as *alcohol*, *alchemy*, and *zero* have been passed on to us; the Latinity was subsequently reviewed by a clerk who usually put his name to the MS. It will thus be seen why the Latin translations failed to convey a true conception of Arabian Medicine ("Sarracenic studies") to the mediaeval scholastics.

Inaccurate as these translations were, they were the works that exercised a dominating influence over the minds of the thinkers of the West from the twelfth to the fifteenth century, when the discovery of the Greek texts and their more accurate translation, led to the rise of a school of Hellenists and to a taste for the purer sources of learning. The controversy between

the Arabists and Hellenists which began in the fifteenth century, continued into the sixteenth, when the work of Vesalius the anatomist and Copernicus the astronomer saw the gradual replacement of the Arabist teaching in the medical schools of Europe by the work of the "experimenters", who, casting aside their reverence for the doctrines of the Ancients, looked to Nature herself for her secrets; the efforts of these early moderns, led to the divorce of medicine and astrology and to the speculative medicine of the Arabists being brought to a state of exaggerated contempt.

With the discovery of the Greek texts, Arabist doctrines were less freely held, but the Arabist medical school in Northern Italy, which long survived its usefulness, strange to say, was the last to relinquish its allegiance to the dictates of the Graeco-Arabic writers of Islam. In short, the history of European Medicine in the later Middle Ages is the history of the influence of the Arabians on Mediaeval Europe.

The history of the development of Arabian Medicine which reached its maturity in the ninth century, and its subsequent dominant position in Europe long after the Western or Cordovan Caliphate had ceased to exist, will be described in the following pages. The vast number of Arabic MSS. which are extant, bear chiefly on the works of Hippocrates and Galen, and are scattered in the libraries of Europe, and some are in Cairo: these MSS., of which an approximately complete list will be given in the body of the book, will be discussed in detail under their appropriate headings. Of these MSS. it may be noted that some of them represent our only source of the actual classical material, the Greek originals being lost.

The great interest of Arabian Medicine and Science centres on the fact that while Europe was in its Dark Age, the Caliphs of Baghdad and Cordova endowed and fostered education among their subjects (Mahomedan and "unbeliever") to the extent that in the latter city, which enjoyed a "golden age" analogous

to that of Ancient Greece, every boy and girl of twelve was able to read and write, and this at a time when the barons and ladies of Christendom were scarcely able to write their names.

The Arabians raised the dignity of the medical profession from that of a menial calling to the rank of one of the learned professions; they were the first to introduce systematically arranged illustrations in their medical writings, and also gave us their system of numbering which has all but replaced the cumbersome Roman numerals. They also developed the science of chemistry as applied to medicine, and considerably improved the art of dispensing by the introduction of such elegant preparations as rose and orange water. To the Arabians we owe the introduction of the idea of the legal control of qualifying examinations for admission to the medical profession, and though the idea of establishing hospitals did not originate with them, they were responsible for the establishment of a large number of these institutions, which they richly endowed.

In addition, Arabic scholarship gave the Latin West a taste for Greek culture at a time when intellectual Europe was in a state of degradation; while Arabian aggression towards "far Byzantium" drove the remnants of Greek learning westward to the eventual dismay of the European Arabists, who had derived their reading of the classics from the Arabic interpretation as found in the Western Caliphate.

The history of Arabian Medicine affords one of the most interesting studies in culture-drift of which it is possible to give a systematic and authentic narrative.

The story of the Arabic domination in the intellectual history of Mediaeval Europe is of more than academic interest; looking back from the vantage ground of A.D. 1925 we are tempted to look upon the Middle Ages as one of ignorance, superstition, bigotry, and lawlessness, while fighting and religion occupied the whole attention of the great men of those ages, and standing amid the galaxy of the great leaders of the misty past, we see

the great figures looking down upon us from the visor of the knight and the cowl of the monk ; but the Arabist tradition of Mediaeval Europe brings to our minds yet another great figure, that of the Arab physician-philosopher with his gold and silver brocaded turban and his halo of intellectual curiosity and broad tolerance, and who are they amongst us who would place him among the least of these ?

DONALD CAMPBELL.

ARABIAN MEDICINE
AND
ITS INFLUENCE IN THE MIDDLE AGES
VOLUME I

CHAPTER I

GREEK MEDICINE IN ITS RELATION TO THE ARABIANS

The ultimate destinies of Greek Medicine both East and West, will be discussed in subsequent chapters. The Medical Science of the Ancient Greeks, which gives both Modern European Medicine and that of the Mediaeval Arabians its best ideals, underwent a metamorphosis at the hands of the Syriac and Arabic scholars of the East, and in order to arrive at a correct estimation of Arabian Medicine and its influence on the Latin West, it will be necessary briefly to review Greek Medicine. Arabian Medicine was really Greek Medicine, modified by the dictates of religion, climate, and racial characteristics, and rehabilitated in Arabic script. As will be pointed out later, Arabian Medicine acquired much from the East, for Indian professors of medicine were resident at Baghdad during the reign of the Caliph Hārūnu'r-Rashīd; but the ultimate foundations of the medicine of the Arabic scholars of Islam were the medical writings of the "classical period", and those Greek authors whose works were eventually translated into Arabic during the "Golden Age" of Arabian Culture (A.D. 750-850) may now be discussed.

Greek Medicine, as indicated by the MSS. extant, begins in the "Age of Pericles" (561-430), and its dominating figure is HIPPOCRATES (c. 460-360). He was born at Cos, and was a member of the family of Asclepiadæ. Both Plato (*Protagoras*, p. 283; *Phædrus*, p. 211) and Aristotle refer to him as "the eminent medical authority". His works need not be considered in detail here. A man of the highest integrity and purest

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morality, we expect and find that the grand characteristic of Hippocratic Medicine, despite the calumnies of Andreas, was the high conception of the status and duties of the physician. This characteristic is beautifully illustrated in his attitude on "professional secrecy" in the celebrated "Oath of Hippocrates", which rendered into English, reads as follows: "Whatever things I shall see or hear in the course of practice or apart from practice relating to human life, which are not fitting to be proclaimed outside the house, I shall keep to myself, considering such things to be not matters for conversation." (ἃ δ' ἂν ἐν θεραπείῃ ἢ ἴδω ἢ ἀκούσω, ἣ καὶ ἄνευ θεραπείης κατὰ βίον ἀνθρώπων, ἀμύχρῃ ποτε ἐκκαλέεσθαι ἔξω διγύσσομαι ἄρρητα ἡγεύμενος εἶναι τὰ τοιαῦτα.) The next grand trait was the skill and balance with which the medical tools available during his day were used: in this we recognize the true Greek *σωφροσύνη*. The next grand characteristic of Hippocratic medicine was that he advocated clinical observation by which alone success in medicine was possible. These points in the Hippocratic system of medicine led to all that was best, both in Arabian, Mediaeval, and Modern Medicine.

According to the Hippocratic System, it must be noted that theory occupied a not unimportant place, for the *humoral theory* of disease, which has dominated medical thought ever since his day, is said to have originated with Hippocrates: it is doubtful whether this doctrine was fully expounded by Hippocrates, though it is regarded as belonging to his system. The 'humoral theory', which was developed some five hundred years later by Galen, held that the body contains four humors, i.e. blood, phlegm, and black and yellow bile, and that disease was due to an irregular or improper distribution of these.

The part played by the *humors* in acute diseases was, that in the first stage they were "crude", in the second they passed through a process of digestion or "coction" (a theory widely adopted in the Arabian School), and in the third they were

expelled from the body by "resolution" or "crisis". The practitioner was to foresee the symptoms with precision.

That the last Hippocratic doctrine was deeply impressed on Arabian Medicine is seen in the *Liber Continens* of Rhazes, in which he gives a prognosis with much precision. Rhazes writes: "I thereupon informed him that the feverish symptoms would not recur, and so it was." (This work is in Arabic manuscript in the Bodleian Library. *Marsh*, 156 ff., 237, 239b-245b.)

Of the eighty-seven treatises that constitute what came to be termed the "Hippocratic Collection", only a portion of which can be accepted as genuine works of Hippocrates (see Adam's "Genuine Works of Hippocrates", Sydenham Society, i, 27, 28), we may mention a few: *Rhazes* (of the Eastern Caliphate) made use of the following:—"De humoribus," "De diæta," and "De morbis".

The "Hippocratic Collection" was largely translated into Arabic between the years A.D. 750-850. The following is an approximately complete list of the Hippocratic works translated into Arabic: *De aëre, aquis, et locis*; *Prognosticon*; *De diæta (regimine) acutorum*; *De morbis popularibus, I-VII*; *Aphorismi*; *De natura hominis*; *De octimestri partu*; *De genitura*; *De septimanis*; *Præceptiones*; *Epistula ad Thessalum*; *Testamentum*; *Prognostica (De indiciis mortis)*; *De pustulis et apostematibus significantibus mortem*; *De situ regionum et dispositione anni temporum*; *Opera varia*; and *Excerpta varia*.

Hippocrates was known as *Ibukrat* or *Bukrat* in Arabian Literature.

The next great figure among the Greeks, that towered prominently in Arabian Medicine, was ARISTOTLE (384-322 B.C.) of Stagira. A pupil of Plato for about twenty years, he diverged from his master in the realms of metaphysics. Of his early writings but a fragment remain. The material available points to Aristotle not having published his matured philosophical system during his own lifetime.

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Though not a physician, he gave to both Arabian and European Medicine the beginnings of biology and the use of 'formal logic' as an instrument of precision: he foreshadowed the doctrine of evolution in his remarks on racial characteristics in their relation to climate.

A large number of works have been ascribed to him, but though some of them were spurious, we may accept the following as genuine. We will omit those that are not of direct interest to us. The following list is that of extant works which embody the System of Aristotle, which made a deep impression on Arabian Medicine and Philosophy: *Categoriæ*; *De interpretatione*; *Analytica Priora*; *Analytica Posteriora*; *Topica*; *Sophistici Elenchi*; the first five of these works on Logic were later grouped together as the *Organon*. His works on natural science include the following: *Physica Auscultatio*; *De cælo*; *De generatione et corruptione*; *De anima*; *De sensu et sensili*; *De memoria et reminiscentia*; *De insomniis*; *De respiratione*; *De spiritu*; *Historia animalium*; *De partibus animalium*; *De animalium generatione*; and a work on physiognomy and the sympathy of body and soul, entitled *Φυσιογνωμονικά* (*Physiognomonica*), which, however, is not considered a genuine work of Aristotle.

In the East, Aristotle was translated into Syriac by Sergius of Ras al-'Ayn (d. 536), and in the eighth and ninth centuries Johannitius, who was also known as Ḥunayn ibn Ishāq (d. 873), and his staff of translators, carried over, among the principal medical and philosophical writings of the Greeks, the works of Aristotle from the language of the Syrians into Arabic, the language of learned Islam.

The influence of Aristotle on the Arabians, or to be precise, the small group of Arabic speaking philosophers in the Empire of Islam, who were constantly under the suspicion of the masses of the Mahomedans, is nothing more or less than a continuation of the history of Aristotelianism. Prior to the rise of the

Arabs as a Power, Aristotelianism had passed through the monastic schools of Asia Minor and had become tinged with the Eastern Platonism that prevailed there up to the time of Mahomet: with the efflorescence of Islam as an intellectual power, it came in contact with the few but intrepid Arabian thinkers. Aristotle represented to the Arabic scholars a summary of Greek Philosophy, and it is owing to the Arabs that Aristotle assumed a paramount place in the mode of thought among the physician-philosophers of Islam, and through them, among the Medical Scholastics of Europe. That Aristotle was diligently studied in England in the fourteenth century is shown by Chaucer (c. 1340–1400) in the Prologue to the *Canterbury Tales*, lines 293–5, which describe the leanings of a Clerk of Oxenford.

For him was lever have at his beddes heed
Twenty bokes, clad in blak or reed,
Of Aristotle and his philosophye.¹

The great effect of Aristotelianism among the Arabs was the tendency to break away from orthodoxy, while closely adhering to the Arabic text of Aristotle: this latter movement culminated in the *Kitab-al-Kullyyat* and *Commentaries on Aristotle* of Averroës (1126–98) of Cordova.

After the destruction of Corinth in 146 B.C., Greek Medicine migrated to Rome where beyond the magnificent sanitation of the architect Vitruvius, Græco-Roman Medicine presents us with a period of stagnation. The physicians of Rome in the main came from the East and Alexandria. Alexandrian Medicine, of which our principal source is Celsus,² more than compensated for the lack of progress in the West, by the development of its anatomical school in the five centuries that intervened between Hippocrates and Galen. With the name of CLAUDIUS

¹ W. W. Skeat's edition, Oxford, 1919, p. 422.

² T. Clifford Allbutt, *The Historical Relations of Medicine and Surgery* (London, 1905), p. 12.

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GALEN (131-210), the period of "practical anatomy" of ancient times comes to a close. Galen, who studied at Alexandria, migrated to Rome, where he became physician to the Emperor Commodus, and acquired a great reputation. His anatomical knowledge which came to represent to the Arabians a summary of Greek Medicine, must be regarded as the accumulated anatomical knowledge up to his time.¹ Numerous works on anatomy have been ascribed to him, but owing to the fact that he studied under several teachers, the written works of Galen are probably not all based on personal research. Of Galen's works the following were translated into Arabic: *Ars Medica*; *De elementis secundum Hippocratem*; *De temperamentis*; *De facultatibus naturalibus*; ² *De Anatomicis administrationibus*; *De venarum arteriarumque dissectione*; *De nervorum dissectione*; *De iuvamentis membrorum libri X*; *De bono habitu*; *De atra bile*; *De optima corporis nostri constitutione*; *De sanitate tuenda libri VI*; *De alimentorum facultatibus libri III*; *De differentiis*

¹ An early reference to human dissections may be noted here with interest. Many centuries earlier than the Ptolemaic school of anatomy at Alexandria, the Chinese physician Pien Ch'iao dissected the cadaver and elaborated a "science of the pulse", which is professed by the Chinese leeches to this day. Pien Ch'iao may be called the Chinese Galen. The history of the relation of Chinese Medicine and Philosophy to that of the Arabians and Mediaeval Europe is yet to be unravelled.

The oldest anatomical treatise extant, however, is an Egyptian papyrus (? 1600 B.C.). Cf. A. Macalister's "Archæologia Anatomica": *Jour. Anat. and Phys.*, vol. xxxii, p. 775. The hepatoscopy of Babylonian-Assyrian civilization and the recent discoveries in the Valley of the Kings at Luxor, may possibly shed some light on the path of those whose researches include the anatomy of antiquity.

² An English translation of this work together with the Greek text has been published in the Loeb Classical Library under the title *Galen on the Natural Faculties, with an English translation by A. J. Brock* (London, 1916). Page xxv of the introduction contains the following: "if Galen be looked on as a crystallisation of Greek medicine, then this book may be looked on as a crystallisation of Galen." This English translation which is directly from the Greek text, has been compared with Linacre's Latin translation (1523) and the French rendering of Charles Daremberg (1854-6).

morborum ; De morborum causis ; De symptomatum differentiis De symptomatum causis libri III ; De differentiis februm libri II De marcere ; De tumoribus prætor naturam ; De inequali intemperie ; De locis affectis libri VI ; De pulsuum differentiis libri IV ; De dignoscendis pulsibus libri IV ; De causis pulsuum libri IV ; De præsagitione ex pulsibus libri IV ; De crisi libri III ; De diebus decretoriis libri III ; Methodi medendi libri XIV ; De Glauconem de medendi methodo libri II ; Puero epileptico consilium ; De simplicium medicamentorum temperamentis facultatibus libri XI ; De compositione medicamentorum secundum locos libri X ; De compositione medicamentorum per genera libri VII ; De antidotis libri II ; De theriaca ad Pisonem liber ; Introductio sive medicus ; Galeni in Hippocratis de natura hominis lib. commentarii II ; In Hippocratis librum de acutorum victu commentarii IV ; In Hippocratis epidemiarum librum primum commentarii VI ; Hippocratis aphorismi et Galeni in eos commentarii VII ; In Hippocratis prognosticum commentarii III ; De musculorum dissectione ; Præsentatio omnino vera expertaque ; De anatomia ; De arte medica ; De urinis ; Remedia ; De clysteribus et colica ; Diagnostica ; De cura icteri ; De medicamentis expertis ; In Hippocratem de septenario numero ; De morte subita ; De secretis feminarum et virorum ; De nominibus medicinalibus ; De prohibenda sepultura ; Laterculi librorum Galeni antiqui ; and Opera Varia.¹

From the preceding it will be seen that his works were an encyclopædia of the medical teaching not only of the anatomical school of Alexandria, but of Greek Medicine as a whole.

Galen elaborated the humoral doctrine of Aristotle ; this was eagerly absorbed by the monotheistic followers of Mahomet, and later passed on to Europe. Together with these physiological speculations, which were a "well-instructed issue from

¹ See pp. 20-30.

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the Platonic and Aristotelian cosmology",¹ his anatomical writings constituted the sole authority on the subject in Europe until the time of Vesalius (1543), and were the only real knowledge among the Arabians and in Europe for fourteen centuries, for Mundinus of Bologna, who dissected a human body in A.D. 1215, did not influence the followers of Galen.

After the death of Galen, and the passing of the "anatomical period" of ancient times, we arrive at the Byzantine Period of Greek Medicine. This period was one during which Greek Medicine was conserved in the Eastern Empire. During this period Greek Medicine contributes four writers only and the work of these were, in the main, mere quotations from Hippocrates and Galen; so that although they did not contribute to any advancement, they kept the torch of medical learning dimly lit during a time when the indolence of their contemporaries all but extinguished it. That this view is not universally accepted is shown by Choulant² and it has been maintained that these Greek authors of the post-Galenic Greek period are far from deserving the imputation of mere compilers. The medical writings of the later Greek physicians were used by the Arabians, and constituted a portion of the ancient medical heritage of the Greeks that was rescued from antiquity by the Arabians.

Of the later Greek medical writers, all of whom were compilers and encyclopædists, may be mentioned ORIBASIUS (326-403), who was court physician to the Emperor Julian. He presents us with a lucid *résumé* of the lesser known works of the writers of antiquity, e.g. Heliodorus, Antyllus, and Archigenes. He also copied from Hippocrates, Galen, and Dioscorides, and referred to the writings of Herophilus and Erasistratus, the two main pillars of the Anatomical School of Alexandria.

¹ M. Neuburger, *History of Medicine*, Playfair's English translation, vol. i (1910), p. 354.

² L. Choulant, *Bücherkunde für die ältere Medizin* (Leipzig, 1841), p. 137.

The writings of Oribasius, of which there are MSS. extant, are his *Medicæ collectiones ad Julianum*; *Conspectus ad Eustathium filium libri V*; *Ad Eunapium de parabilibus medicamentis libri IV*; *Commentarius in Hippocratis Aphorismos*; *Commentarius in Hippocratis Prognostica*; *Commentarius in artem Galeni*; *Opera Varia*; and *Excerpta varia*.

Of these works, Rhazes (the Arabian) used *Medicæ collectiones ad Julianum*, books I-V, XI-XIII, XV, XXIV-XXV, and books II-IV, VII, VIII, and IX of the "Synopsis", in the compilation of his *Liber ad Almansorem*. Although Oribasius' anatomical writings earned him the surname of 'The Ape of Galen', he described the salivary glands, a part of the body overlooked by Galen.

There are, however, no Arabic translations of this Greek writer extant.

AETIUS AMIDENUS (502-75) borrowed much of his material from Archigenes, and was the first medical man of note to adopt Christianity; and his works formed a complete summary of medicine and surgery.

His works of which MSS. are extant are *Iatricorum libri XVI* and *Opera Varia*. Though there are no Arabic MSS. extant, his *lib. I, III-VI* were used by Rhazes, whose "Royal Book" exercised a great influence over Arabian Medicine.

ALEXANDER OF TRALLES (525-605) did not contribute to the advancement of medicine, and as there is no direct evidence that his works were translated into Arabic, he is not of special interest to us. Yahyā ibn Serabi, who was known to the Latin West as Serapion Senior, wrote two works in Syriac in which he is said to have transcribed from Alexander of Tralles;¹ both these works were later translated into Arabic.²

PAUL OF ÆGINA (615-90) flourished at the time of the

¹ J. Freind, *The History of Physick* (London, pt. ii, 1750), pp. 42-3.

² A Latin translation of Alexander's *Epistola de lumbricis*, together with Rhazes' *De variolis et morbillis*, was published at Lausanne in 1772.

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Mahomedan conquest and was the last of the Greek compilers ; he is known to have travelled a great deal among the Arabians, among whom he was in great demand because of his obstretical skill. Paul freely copied from Galen, Oribasius, and Aëtius. His works, of which Greek MSS. are extant, are : *Epitomæ medicæ libri septem* ; *De succedaneis ex Galeno* ; *De urinis libri VII* ; *De mensuris et ponderibus* ; and *Excerpta varia*. There are Arabic MSS. in Munich (*Monac. hebr.* 214, s. xv, No. 10), Paris (*Parisin. gr.* 2293, s. xiv). [L. I–III, initio et fino mutili, græce et arabice], and Rome (*Casanat. hebr.* 200, s. xvi, No. 12. *Urb. hebr.* 46, s. —, No. 2). Paul's *Epitome* was freely used by Rhazes in his *Kitabu 'l-Maliki*, and also by Albucasis in his *Surgical Tracts* ; the latter drew his surgical material, in the main, from the sixth book of Paul's *Epitome*, which it displaced as the standard textbook on surgery. Paul's surgery is therefore of particular interest, not only in Arabian Medicine but also in the medical system of the West during the Middle Ages.

He was an experienced surgeon and performed the operation of bronchotomy after the method of Antyllus.

After Paul of Ægina, Greek Medicine, for lack of a favourable soil in Europe, found itself absorbed by the Arabians. The process by which Greek Medicine came under the foster-parentage of the Arabic scholars of Islam, and the great body of the *Corpus Hippocraticum* and *Galenic Writings* carried over into Arabian Medicine, is associated with the decline of Græco-Roman Medicine, associated with the languid efforts of the majority of the Greeks of the Byzantine Period. Since the founding of Alexandria in 331 B.C., however, Greek Medicine had become firmly implanted in Egypt. Here medicine and surgery became conspicuous owing to the practice of anatomical dissections by the anatomists Herophilus and Erasistratus ; but even before this, Diocles of Carystos (350 B.C.), who was a contemporary of Plato, had dissected the human body. In

the third century before Christ, Alexandrian Medicine was introduced into Mesopotamia, and in this way Syria acquired the main body of Hippocratic teaching through the Greek School of Alexandria, while retaining many of the astrologic features of the Assyro-Babylonian Medicine: this dual system was studied by Syrian physicians for over a thousand years.¹

The history of Greek Medicine after the rise of Islam and the development of the Arabic scholars of the East as a people under a single Ruler, is but the history of Galenism: in Europe, the unsettled conditions led to the discouragement of scholarship, while the Caliphs of Baghdad, on the other hand, afforded protection and encouragement to the scholars of all religions. The monotheistic Nestorians of Syria under Arabian rule greatly flourished in the eighth and ninth centuries, and translated the great body of Greek Medical Writings, which had already been rendered into Syriac, into Arabic. By the latter part of the ninth century and early in the tenth, we arrive at the maturity of Arabian Medicine; and the latter is expressed in the work of Rhazes (c. 841-926), who made use of the Arabic translations of the Greek works, both early and late. Thus we see that Arabian Medicine is but a continuation of Syrian Medicine, which was just prior to the time of Mahomet, a version of the medicine of the Ancient Greeks.

The great body of Arabic MSS. which are translations and commentaries of the Greek Medical Works demonstrate the influence of Greek Medicine on the Arabians at a time when Medicine in the West had come to a state of complete inactivity if not of degeneration. These Arabic MSS. will be discussed in detail in the next chapter.

¹ An interesting Syriac text in evidence of this transition has been published by Wallis Budge (Syrian Anatomy, etc., or *The Book of Medicine*, edited by B. A. Wallis Budge, 2 vols., Oxford, 1913), but the first and longer part of the Syriac Book of Medicine is nothing more or less than a translation of Galen's *περί τῶν πεπονθότων τόπων*: *De Locis Affectis*.

CHAPTER II

ARABIC (MEDICAL) MSS.

That the Arabic translators, among whom the most prominent were Mesuë Senior and Johannitius, converted a vast amount of the Greek medical writings into the language of Islam is most significant. It is entirely owing to the Arabic writers that some of the works of Hippocrates and Galen are preserved to us; of the Hippocratic and pseudo-Hippocratic writings of which the Greek originals are lost, but of which the Arabic translations are extant, are the *De opere medicinæ*, the *De pustulis et apostematibus significantibus mortem*, the *Secreta*, and the *De situ regionum et dispositione anni temporum*, while of the Galenic and Pseudo-Galenic writings the following have been preserved to us through the Arabs: *Diagnostica*, *De cura icteri*, *De medicamentis expertis*, *In Hippocratem de septenaris numero*, *De morte subita*, *De prohibenda sepultura*, *Laterculi librorum Galeni antiqui*, and *De anatomicis administrationibus*, books IX–XV.

The Arabic MSS. that are extant are scattered over Europe and the Orient, and are to be seen in the British Museum, the Bodleian Library, Cambridge, Cairo, Constantinople, the Escorial, Madrid, Bologna, Florence, Rome, Paris, Vienna, Leyden, Berlin, Munich, Gotha, Dublin, Petrograd, Norfolk, Upsala, and Algeria; the MSS. make it abundantly evident that Arabic Medicine not only introduced a taste for Greek Medicine in the West, but fostered it during the Dark Ages of Europe.

The Latin MSS. of the Greek works of which the Greek originals are lost, are later than their Arabic equivalents, and were translated from the Arabic versions that were extant in the West of Europe.

The MSS. now to be given in detail form a complete list of the translations and commentaries of the Greek medical works of known authors, that were prepared by the Arabians, and afford conclusive documentary evidence of the close relationship between Greek and Arabian Medicine in the Middle Ages.

An asterisk after the MS. indicates that it is an abbreviation of an original.

HIPPOCRATES

Opera Varia

Cambridge : Bibl. Univ. 1386 ; s. xiii, vol. xiv, No. 8-10, 12-14
(Comm. arab.)

Constantinople : Nuri Othmaniiyya 3547 ; s. —
A.S. 3592 ; s. —

3632 (XI, scripta)

Munich : Monac. 805 ; s. xviii (Comm. Arab.)

De aëre, aquis, et locis

Cairo : Bibl. Khediviale 21048 (VI, 28) ; s. xix

Cambridge : Bibl. Univ. 1386, 5 ; s. xiii, vol. xiv

Constantinople : Aya Sofia 3572 ; s. —
4838, 2 ; s. —

Prognosticon

Berlin : Berol. 6227 ; s. xvi

Cambridge : Caius Coll. 948 ; s. —

Bibl. Univ. 1386 ; s. xiii, vol. xiv, No. 7 (Comm.)

Constantinople : Bāyazīd 2506 ; s. — (Comm.)

Nuri Othman. 3524 ; s. — (Comm.)

3525 ; s. — (Comm.)

Escorial : Scorial. 857, 3, f. 35-42 ; s. xiii (?)

Gotha : Gothan. 1899 ; s. — (Comm.)

1900 ; s. xiii (Comm.)

2023 ; s. xiv et xvii, f. 73-85

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Leyden : Bibl. acad. 1296 ; s. — (Comm.)

Oxford : Bodleian. 191 ; s. xiii (Comm.)

530 ; s. — (c. Comm. Gal.)

533 ; s. — (Comm.)

Coll. Merton. 22 ; s. —

Paris : Parisin. 2835 ; s. xiii (?), f. 29-48 et f. 49-157 (Comm.)

2844 ; s. xiv, f. 99-186 (Comm.)

Turin : Taurin. Catal. 1, p. 219 *

De dicæta (regimine) acutorum

Constantinople : Aya Sofia 4838, 1 ; s. —

Escorial : Scorial. 857, 4 ; s. xiii (?), f. 42-51

Paris : Parisin. hebr. 1203, 2 ; s. xiv

De morbis popularibus I et III

Constantinople : Aya Sofia 3642 ; s. — (Comm. Arab.)

Escorial : Scorial. 804 ; s. xiii (?), c. C. Gal.

De morbis popularibus II, IV-VII

Constantinople : Aya Sofia 3642 ; s. — (Comm. Arab.)

Escorial : Scorial. 805 ; s. xiii

Paris : Parisin. 2846 ; s. xix

De natura hominis

Cambridge : Bibl. Univ. 1386, 2 ; s. —

Florence : Laurent. 226, 1 et 3 (c. Comm.) ; s. —

De octimestri partu

Munich : Monacens. 805 ; s. xvii (Comm.)

De genitura

Cambridge : Bibl. Univ. 1386, 1 ; s. xiii, vol. xiv

Præceptiones

Constantinople : Aya Sofia 3555, 5 (?) ; s. —

Aphorismi

Algiers : nr. 1743 ; s. xiii (c. Comm.)

1744 ; s. xviii (c. C.)

1745 ; s. xviii (c. C.)

Berlin : Berol. 6221 ; s. xvi

6222 ; s. xiii

6223 ; s. xvii (c. Comm.)

6224 ; s. xix (c. Comm.)

6225 ; s. xiv (c. Comm.)

Cairo : Bibl. Khediviale 7663 ; s. xix (c. C.)

7666 ; s. xvi (c. C.)

Cambridge : Bibl. Univ. 1386 ; s. xiii-xiv, No. 6 (c. Comm.)

Constantinople : Aya Sofia 3554 ; s. — (c. Comm.)

3644 ; s. — (c. C.)

3706 ; s. —

3721, 2 ; s. — (c. C.)

3724 ; s. —

Asad Efendi 2483, 2 ; s. —

Bâyazîd Gami 2474 ; s. —

2508 (c. C.)

2509 (c. C.)

Fatih Gami 3565 ; s. —

Hakim Oglu Ali P. 574 ; s. — (c. C.)

Köprülüzadeh 885 ; s. — (c. C.)

967 ; s. — (c. C.)

Lâhlehlî 1632 ; s. — (c. C.)

Nuri Othmaniîya 3527 ; s. — (c. C.)

3528 ; s. — (c. C.)

Ragib. P. 1482, 3 ; s. — (c. C.)

Yeni Gami 919 ; s. — (c. C.)

Escorial : Scorial. 789 ; s. xiv (c. C. Gal.)

790 ; s. xiii (c. C. Gal.)

791 ; s. xi (c. C. Gal.)

818, 3 ; s. xiii, f. 88-128 (c. C. G.)

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857, 2 ; s. xiii (?), f. 22-35

877 ; s. — (c. C.)

878 ; s. xv (c. C.)

Florence : Laurent. 253, 4 ; s. — (c. C.)

253, 5 ; s. —

253, 6 ; s. —

262, 2 ; s. —

Gotha : Gothan. 1894

1895 ; s. xviii (c. C.)

1896 ; s. xviii (c. C.)

1897 ; s. xiv-xv (c. C.)

1988 ; s. — (c. C.)

2023 ; s. xiv et xviii, f. 55-73

Leyden : Bibl. acad. 1293 ; s. —

1294 ; s. xiii (c. C.)

1295 ; s. xv (c. C.)

London : British Mus. 983 ; s. xviii

Suppl. 804 ; s. xiv (c. C.)

Oxford : Bodl. 533 ; s. — (c. C.)

544 ; s. — (c. C.)

608, 1 ; s. — (c. C.)

614 ; s. xv (c. C.)

627 ; s. xiv (c. C.)

Paris : Parisin. arab. 2835 ; s. xiii, f. 1-28

2836 ; s. xv

2837 ; s. xiii (c. C. G.)

2838 ; s. xiii (c. C.)

2839 ; s. xv (c. C.)

2840 ; s. xvi (c. C.)

2841 ; s. xiii (c. C.)

2842 ; s. xviii (c. C.)

2843 ; s. xv (c. C.)

2844 ; s. xiv, f. 1-98 (c. C.)

hebr. 1202 ; 1 ; s. xv (c. C.)

Rome : Vatic. hebr. 365, 2 ; s. —

hebr. 426 ; s. —

Vienna : Vindob. 37

De septimanis

Cambridge : Bibl. Univ. 1386, 3 ; s. xiii-xiv

Munich : Monac. 802 ; s. xi (c. C. Gal.)

Paris : Parisin. 2845 ; s. xix

Epistula ad Thessalum

Paris : Parisin. 30397 ; s. xviii, f. 87-98

Testamentum

Constantinople : Ragib Pasch 1482 ; s. —

Petrograd : Institut. arab. 170 ; s. —, f. 292-4

Prognostica

(De indicibus mortis)

Berlin : Berol. 6228 ; s. xvii

6229 ; s. xvi (Avicennæ *carm.*)

Constantinople : Köprülüzadeh 1601, 8 ; s. —

London : Brit. Mus. 893, 6 ; s. xix

989, 2 ; s. xix

Munich : Monac. hebr. 275 ; s. —

Paris : Parisin. 2868, 2 ; s. xiv, f. 192-3 (*De morte*)

2946, 4 ; s. xv, f. 145-7 (*De morte*)

Vienna : Vindob. acad. 377 ; s. —

De pustulis et apostematibus significantibus mortem

London : Brit. Mus. 989, 2 ; s. xix (*De pustulis*)

Oxford : Bodl. 611 ; s. — (*De pust. frgm.*)

Secreta

Munich : Monacens. hebr. 275 ; s. — (*Liber secretorum*)

De situ regionum et dispositione anni temporum

Paris : 2556 ; s. xvii

Excerpta varia

Florence : Laurent. 256, 1 ; s. —

Gotha : Gothan. 1937 ; s. —

GALEN

Opera varia

Constantinople : Aya Sofia 3572 ; s. —

3588 ; s. — (*De medicina*)

3609 ; s. — (*Summar. Alexandr.*)

3661 ; s. — (*De sect. part. corp. ?*)

3676 ; s. — (*De medicina*)

3701 ; s. —

Asir Efendi 266 ; s. —

Fatih Gami 3538 ; s. —

3539 ; s. —

Nuri Othamn. 3553, 3554, 3555, 3581, and 3593

Yeni Gami 1179, 3 ; s. —

London : Brit. Mus. syr. 221 ; s. —

222 ; s. —

225 ; s. viii-ix

444 ; s. xiii

875 ; s. —

Madrid : Matrit. bibl. nac. Gg. 152 ; s. —

De sectis ad eos qui introducuntur

Constantinople : Aya Sofia 3557 ; s. —

Florence : Laurent. 235a ; s. xiii

London : Brit. Mus. 1356 ; s. xvii, f. 2-20 (*Summar. Alexandr.*)

Paris : Parisin. 2859 ; s. xi, f. 1-12

2860 ; s. xiii, f. 1-14

Ars medica

Constantinople : Aya Sofia 3711 ; s. —

Escorial : Scorial. 883 ; s. xiii (? c. Comm. Gal.)

Florence : Laurent. 235b ; s. xiii

London : Brit. Mus. 443 ; s. xi (c. Comm.)

syr. 1005, 1 ; s. viii

1356 ; s. xvii, f. 21-47 (*Summar. Alexandr.*)

Paris : Parisin. 2860, 2 ; s. xiii, f. 14-48

De elementis secundum Hippocratem

Berlin : Berol. 6234 ; s. xvii, f. 1-13

Constantinople : Aya Sofia 3593 (?) ; s. —

Escorial : Scorial. 874, 2 ; s. xiii (?), f. 56-82

881, 1 ; s. —, f. 1-21

Florence : Laurent. 235 ; s. xiii

London : Brit. Mus. 1356 ; s. xvii, f. 157-75 (*Summar. Alexandr.*)

Madrid : Matrit. bibl. nac. 130, 1 (Gg 153) ; s. xv

Paris : Parisin. 2847, 1 ; s. xiii, f. 1-32

2848, 1 ; s. xi, f. 1-35 (c. Comm.)

De temperamentis

Cairo : Bibl. Khediviale 4384 ; s. —

Escorial : Scorial. 848, 1 ; s. xiv (?), f. 1-46

879 ; s. xiii (?)

881, 2 ; s. —, f. 22-68

Florence : Laurent. 235g ; s. xiii

London : Brit. Mus. 1356 ; s. xvii, f. 176-208 (*Summar. Alexandr.*)

Madrid : Matritens. bibl. nac. 130, 2 (Gg 152) ; s. xv

Paris : Parisin. 2847, 2 ; s. xiii, f. 33-105

2848, 2 ; s. xi, f. 35-139 (Comm.)

De facultatibus naturalibus

Constantinople : Aya Sofia 2457 ; s. —, No. 4

Escorial : Scorial. 846 ; s. xiii

847 ; s. xiii (?)

848, 3 ; s. xiv, f. 53-107

881, 3 ; s. —, f. 69-130

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Florence : Laurent. 235h ; s. xiii

Leyden : Bibl. acad. 747 ; s. —

1297 ; s. xii

De anatomicis administrationibus

Dublin : Bibl. Narcissi 1787 ; s. — (last six books)

London : Brit. Mus. 1355 ; s. xv

Oxford : Bodl. Uri 567 ; s. —

570 ; s. xviii (Lib. X–XV)

Paris : Parisin. 1002 ; s. —, No. 2

2851 ; s. xix (Lib. IX–XV)

2852 ; s. — (L. X init.)

De ossibus ad Tirones

Berlin : Berol. 6233 ; s. x–xvii, f. 14–30

Florence : Laurent. 235l ; s. xviii

London : Brit. Mus. 1356 ; s. xvii, f. 239–56 (*Summar. Alexandr.*)

De venarum arteriarumque dissectione

Berlin : Berol. 6233 ; s. xvii, f. 76–93

Florence : Laurent. 235, l ; s. xiii

London : Brit. Mus. 1356 ; s. xvii, f. 280–91 (*Summar. Alexandr.*)

De antidotis libri II

Berlin : Berol. 6231* ; s. xiv, f. 484–552

Cairo : Bibl. Khediviale 16296 ; s. xvi (Joh. Gr. interpr.)

Petrograd : Petropolit. bibl. imp. 123 ; s. xiii (Joh. Gr.)

Vienna : Vindob. 1462 ; s. — (Joh. Gr.)

De nervorum dissectione

Berlin : Berol. 6233 ; s. xvii, f. 67–75

Florence : Laurent. 235k ; s. xiii

London : Brit. Mus. 1356 ; s. xvii, f. 275–280 (*Summar. Alexandr.*)

De iuvamentis membrorum libri X

Dublin : Bibl. Narcissi 1709

Escorial : Scorial. 850 ; s. xii

Gotha : Gothan. 1906 ; s. — (Comm. in libr. xi)

Paris : Parisin. 2853 ; s. xiii

2854 ; s. xv (Comm.)

De bono habitu

Constantinople : Aya Sofia 4838 ; s. —, No. 6

Madrid : Matrit. bibl. nac. 130, 5 (Gg 152) ; s. xv

Paris : Parisin. 2847 ; s. xiii, f. 118–20

De altra bile

Petrograd : Petropol. by Steinschneider, hebr. Übersetz.,
p. 655 and footnote 26

De sanitate tuenda libri VI

Constantinople : Aya Sofia 3583 ; s. —

Escorial : Scorial. 802, 3 ; s. xiii, f. 77–97

Florence : Laurent. 226 ; s. —, No. 2

235 ; s. —

263 ; s. —, No. 1

Leyden : Bibl. acad. 1299 ; s. — (Paraphrase)

Paris : Parisin. 2858 ; s. xiv

De alimentorum facultatibus libri III

Escorial : Scorial. 802, 1 ; s. xiii, f. 1–18 (*De alimentis*)

London : Brit. Mus. syr. 1005 ; s. viii (Frgm.)

Paris : Parisin. 2857, 2 ; s. xiv, f. 31–61

De differentiis morborum

Constantinople : Aya Sofia 3591 ; s. —

Escorial : Scorial. 798, 1 ; s. —, f. 1–13

799, 1 ; s. xii

800, 1 ; s. xiii (?)

818, 2 ; s. xiv, f. 53–68

849, 1 ; s. xiv

880, 1 ; s. xiv, f. 1–22

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Florence : Laurent. 235m ; s. xiii

Paris : Parisin. 2859 ; s. xi, f. 12-22

De symptomatum differentiis

Constantinople : Aya Sofia 3591 ; s. —

Escorial : Scorial. 798, 2 ; s. —, f. 24-49

799 ; s. xii

800 ; s. xiii (?)

880, 3 ; s. xiv, f. 42-62

Florence : Laurent. 235m ; s. xiii

Paris : Parisin. 2859 ; s. xi, f. 33-43

De symptomatum causis libri III

Constantinople : Aya Sofia 3591 ; s. —

Escorial : Scorial. 798, 4-6 ; s. —, f. 50-8

799 ; s. xii

800 ; s. xiii (?)

880, 4-6 ; s. xiv, f. 62-107 et f. 108-41

(Libri II, III)

884, 3 ; s. xiii (" Epitome, opus Averrois,"

Derenbourg)

Florence : Laurent. 235m ; s. xiii

Paris : Parisin. 2859 ; s. xi, f. 43-86

Secreta

Munich : Monac. hebr. 243 ; s. xv (?). (*De secretis remediis*)

De differentiis februm libri II

Constantinople : Aya Sofia 3709 (?) ; s. —

Escorial : Scorial. 797, 1 ; s. xiii, f. 1-30

884, 1 ; s. xiii, f. 1-7 (" Epitome, initio
carens, opus Averrois," Derenbourg)

Florence : Laurent. 235 ; s. xiii

De marcure

Florence : Laurent. 235e ; s. xiii

Oxford : Bodl. 579 ; s. —

De tumoribus præter naturam

Constantinople : Aya Sofia 3709 (?) ; s. —

De inæquali intemperie

Escorial : Scorial. 848, 2 ; s. xiv (?), f. 47–52

Madrid : Matrit. bibl. nac. 130, 3 (Gg 152) ; s. xv

Paris : Parisin. 2847 ; s. xiii, f. 106–13

De locis affectis libri VI

Constantinople : Aya Sofia 3589 ; s. —

3590 ; s. —

Escorial : Scorial. 799, 2 ; s. xii

849, 2 ; s. xiv

Florence : Laurent. 235m ; s. xiii

Gotha : Gothan. 1901 ; s. xviii

Munich : Monacens. 803 ; s. —

De tactu pulsus

Berlin : Berol. 6230 ; s. xii (Comm.)

Constantinople : Bāyazīd G. 2542, 2 ; s. —

Florence : Laurent. 235c ; s. xiii

London : Brit. Mus. 1356 ; s. xvii, f. 48–72 (*Summar. Alex.*)

Paris : Parisin. 2860, 3 ; s. xiii, f. 48–61

De pulsuum differentiis libri IV

Oxford : Bodl. (II, 2) 333, 1 ; s. xiv (L. 1, 4–29)

De dignoscendis pulsibus libri IV

Oxford : Bodl. (II, 2), 333, 2* ; s. xiv

De causis pulsuum libri IV

Oxford : Bodl. (II, 2), 333, 3* ; s. xiv

De præsagitione ex pulsibus libri IV

Gotha : Gothan. 1904 ; s. xviii, f. 102–207

1905 ; s. —

Oxford : Bodl. (II, 2), 333, 4 ; s. xiv

De crisibus libri III

Escorial : Scorial. 797, 3 ; s. xiii, f. 69-120

849, 1 ; s. xii, f. 1-83

Florence : Laurent. 235p ; s. xiii

De diebus decretoriis libri III

Escorial : Scorial. 797, 2 ; s. xiii, f. 31-68

Florence : Laurent. 235q ; s. xiii

Puero epileptico consilium

Munich : Monacens. hebr. 295 ; s. xv, No. 4

Introductio sive medicus

Norfolk : Nr. 3383

De theriaca ad Pisonem liber

Vienna : Vindob. ap. Lambac. comment. VI, p. 143

Methodi medendi libri XIV

Constantinople : Nuri Othmaniiyya 3504 ; s. — (L. I-X ?)

Florence : Laurent. 235r ; s. xiii

Gotha : Gothan. 1902 ; s. xii ? (L. I-IV)

1903 ; s. — (L. I-IV)

1904 ; s. xviii, f. 1-86 (L. I-IV)

Leyden : Bibl. acad. 1298 ; s. xii (Comm.)

London : Brit. Mus. 442 ; s. xiii-xiv (L. III)

Oxford : Bodl. 615 ; s. —, f. 1-14

Paris : Parisin. 2855 ; s. xiv (?) (L. I-V)

In Hippocratis epidemiarum librum primum commentarii III

in librum secundum commentarii V

in librum tertium commentarii III

in librum sextum commentarii VI

Escorial : Scorial. 804 ; s. — (in lib. I comm. I-III

in lib. II comm. I-VI

in lib. III comm. I-III)

805 ; s. xiii (in lib. VI comm. I-VIII)

Munich : Monac. 1050 ; s. ix

Paris : Parisin. 2846 ; s. xix (L. II et VI)

Hippocratis aphorismi et Galeni in eos commentarii VII

Escorial : Scorial. 789 ; s. xv (?)

790 ; s. xiii

791 ; s. xii

818, 3 ; s. xiii (" Frgm. litt. 790 ",

Derenbourg)

Florence : Laurent. 260, 3 ; s. —

Oxford : Bodl. 530 ; s. —

Paris : Parisin. 2837 ; s. xiii

Rome : Vatic. 426 ; s. —

521 ; s. xvi

In Hippocratis prognosticum commentarii III

Oxford : Bodl. 439 ; s. —

530 ; s. —

De musculorum dissectione

Berlin : Berol. 6244 ; s. xvii, f. 31-67

London : Brit. Mus. 1356 ; s. xvii, f. 256-275 (*Summar. Alexandr.*)

De venæ sectione

Leyden : Scal. hebr. 2, 17 ; s. xiv

De anatomia

Constantinople : Bāyazīd Gami 2473 ; s. —

Lâhleli 1624 ; s. —

De urinis

Florence : Laurent. 253d ; s. xiii

Madrid : Matrit. bibl. nac. 556, 6 ; s. xvii

Rome : Vatic. (hebr.) 369 ; s. —

In Hippocratem de septenario numero

Cambridge : Bibl. Univ. 1386, 3 ; s. xiii-xiv

Munich : Monacens. 802 ; s. xi

Paris : Parisin. 2845 ; s. xix

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Ad Glauconem de medendi methodo libri II

Escorial : Scorial. 803, 1 ; s. xii (?), f. 1-68

882, 2 ; s. xi, f. 12-141

Florence : Laurent. 235r (?) ; s. xiii

London : Brit. Mus. 1356 ; s. xvii, f. 73-157 (*Summar. Alexandr.*)

Paris : Parisin. 2860, 4 ; s. xiii, f. 61-110

De simplicium medicamentorum temperamentis et facultatibus libri XI

Escorial : Scorial. 793 ; s. xiii (?)

794 ; s. xiii (L. VI-XI)

802, 2 ; s. xiv (*Compendium*)

Florence : Laurent. 226, 2 ; s. —

235 ; s. xiii

London : Brit. Mus. syr. 1004 ; s. vi-vii (L. VI-VIII)

Oxford : Bodl. 615 ; s. —, f. 25-45 (*Compendium*)

Paris : Parisin. 2857 ; s. xiv (?), f. 1-30, 61-136

De compositione medicamentorum secundum locos libri X

Berlin : Berol. 6231 ; s. xiv, f. 114-483

Escorial : Scorial. 795 ; s. xiii ? (L. IV-VI)

801, 2 ; s. xiii, f. 25-175 (L. V-X, imperfect)

Paris : Parisin. 2856 ; s. xiv (?), (Frgmta.)

De compositione medicamentorum per genera libri VII

Berlin : Berol. 6331* ; s. xiv, f. 1-113

Escorial : Scorial. 796 ; s. — (L. V-VII ; end wanting)

Paris : Parisin. 2856 ; s. xiv (Frgmta.)

Galenī in Hippocratis de natura hominis lib. commentarii II

Cambridge : Bibl. Univ. 1386, 2 ; s. xiii-xiv

Florence : Laurent. 226, 1 ; s. —

In Hippocratis librum de acutorum victu commentarii IV

Paris : Parisin. hebr. 1203, 3 ; s. xiv (L. I-III)

De prohibenda sepultura

Leyden : Bibl. acad. 1333 ; s. xiv (= 749 Ackermann in Kühn, i, p. cxcii ?)

Remedia

Escorial : Scorial. 851 ; s. xiv, f. 2-22 (*De medicamentis certis*. " Des tabliaux à 7 colonnes de tous les médicaments mentionnés par Galien," Derenbourg)

Leyden : Bibl. acad. 805 ; s. — (*Ibn Beitar medicamenta simplica Ord. alphab. Ex. Gal. et Dioscor.*)

Upsala : Upsal. ex libr. Jo. Gabr. Sparvenfeld (Weis in Leyd. 805)

Diagnostica

Paris : Parisin. 2868 (Suppl. 1065) ; s. xiv, f. 194 (*Diagnosticorum frgmta.*)

De cura icteri

Berlin : Berol. 6232 ; s. xiii, f. 19-31

De medicamentis expertis

Escorial : Scorial. 851 ; s. xiv, f. 23-32

De morte subita

Berlin : Berol. 6232 ; s. xiii, f. 1-18

De nominibus medicinalibus

Leyden : Bibl. acad. 1300 (= 762 in Kühn i, p. cxcii de vocibus in medica arte usitatis)

De arte medica

Cairo : Cairens. 4384 ; s. — (*Præfatio in medicinam = De temperamentis*, K. i, 509)

Leyden : Bibl. acad. 748 ; s. — (*De arte med. et conservanda valetudine versus*)

De optima corporis nostri constitutione

Constantinople : Aya Sofia 4838 ; s. —, No. 5

Madrid : Matrit. bibl. nac. 130 (Gg 152) ; s. xv

Paris : Parisin. 2847 ; s. xiii, f. 114-18

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De morborum causis

Constantinople : Aya Sofia 3591 ; s. —

Escorial : 798, 2 ; s. —, f. 13–24

799 ; s. xii

800 ; s. xiii (?)

818 ; s. xiv, f. 68–82

849 ; s. xiv

880, 2 ; s. xiv, f. 23–41

Florence : Laurent. 235m ; s. xiii

Paris : Parisin. 2859 ; s. xi, f. 23–32

De secretis feminarum et virorum

Constantinople : Aya Sofia 4838 ; s. —, No. 3 et 4

Laterculi librorum Galeni antiqui

Constantinople : Aya Sofia 3631 ; s. — (*Honein ibn Ishaq de disponendis scriptis Galeni*)

ANDROMACHUS

Theriaca ex anguibus, Tranquillitas dicta

Vienna : Vindob. ap. Lambec. vi, p. 143

DIOSCORIDES

De materia medica libri V

Bologna : Bonon. Marrigli 424 ; s. xiii

Constantinople : Aya Sofia 3702

3703

3704 ; s. — (illustrated)

Escorial : Scorial. 845 ; s. xii (?)

Leyden : Bibl. acad. 1301 ; s. xi (illustrated)

London : Brit. Mus. Suppl. 785 ; s. xiv (Lib. III, IV)

- Madrid : Matrit. bibl. nac. 125 (Gg 147) ; s. xii (?)
 233 (Gg 257) ; s. xvi (?) (Comm. in
 I-III ex. V in.)
- Oxford : Bodl. 573 ; s. —
- Paris : Parisin. 2849 ; s. xiii
 2850 ; s. xii (Fragments)

PAULUS ÆGINETA

De venenis (= ? the fifth book of the *Epitome of Medicine*)

Munich : Monac. hebr. 214 ; s. xv, No. 10

Paris : Parisin. gr. 2293 ; s. xiv (L. I-III, the beginning and
 end of this manuscript are mutilated. Both Greek and
 Arabic texts occur here)

Rome : Casanat. hebr. 200 ; s. xvi, No. 12

Urb. hebr. 46 ; s. —, No. 2

MAGNUS EMESENSIS

De urinis ex ore Theophili

Berlin : Berol. 6232 ; s. xiii, f. 44-59

Constantinople : Aya Sofia 3563, 3 ; s. —

Oxford : Bodl. Marsh 37

Paris : Parisin. hebr. 1202, 2 ; s. xv

CHAPTER III

THE HISTORIOGRAPHY OF ISLAM, WITH SPECIAL REFERENCE TO THE DEVELOPMENT OF ARABIC MEDICAL AND PHILOSOPHICAL LITERATURE

The Arabian Period constitutes a most romantic chapter in the history of medicine, and is of great historical interest. The latter decades of the sixth and the first two of the seventh century were marked by an excess of idolatry, and with the advent of the Prophet Mahomet who preached that there is one God and that the figuring in sculpture of the human figure was not to be tolerated, the warring tribes of Arabia Felix rapidly became welded into a single people under one religious and military commander.

The Arabian Period dates from the year A.D. 622, i.e. the year of Mahomet's Flight (*Hijra*) from Mecca to Medina; this is the year one of the Mahomedan Calendar. The year 640 is sometimes given as the commencement of this period, as it was at this time that the Arabs are alleged to have burnt the precious Second Great Library at Alexandria. A legend has it that the papyri containing the Greek script were used as fuel for the 4,000 baths of Alexandria and that the quantity of them enabled the Moslems to utilize this form of combustible for over a period of six months. This legend has nothing to recommend it, as Gibbons tells us that the fanatical Christians some three centuries earlier had already been fairly thorough in their destructive zeal, while on the other hand, we find that Galen, the last of the Alexandrian School whose works are extant, formed the main pillar of what is known as Arabian Medicine, and that the great body of Galenic and Pseudo-Galenic writings

were prepared and translated into Arabic under the patronage of the Caliphs. It is very probable that the Muslims did destroy a large number of the books that contained Christian teaching. The question of the alleged burning of the Second Great Library of Alexandria is one over which there has been much speculation.¹ There is no reference to this matter by Arabic writers prior to the thirteenth century.

The origin of Arabian Literature can be traced to the recitations, songs, and stories of the pre-Islamitic Arabs. The historiography of the Arabians is characterized by a continuous narrative, in which each event is set out in the words of contemporaries and eyewitnesses. The mass of the learning was conveyed by reciters (*rāwīs*) who passed on the narrative to their successors. This practice led to the lack of independent criticism, but the writers exercised a certain choice in the selection of their authorities. Thus it was that some of the later writers often produced verbatim copies of the writings of the earlier authorities.

The desire to clear up the undecided points in the teaching of Mahomet led to the formation of an Arabic school at Medina, where the memory was assisted by written jottings such as those taken down by Ḥasan of Baṣra (d. A.D. 728); oral tradition, however, still continued to be the one recognized authority. In the first century of the Mahomedan Calendar, i.e. from A.D. 622 to 719, no independent work in Arabic was produced. In the second century, i.e. from A.D. 719 to 816, books, as we understand them, began to appear: the production of these received a definite impetus by the practice of studying genealogy, particularly in relationship to the Prophet, and thus we have the beginnings of written Arabian History from which it is possible to arrive at an authentic narrative of events among the Muslims.

¹ Cf. Gibbon's *Decline and Fall of the Roman Empire*, ed. W. Smith (London, 1858), pp. 474-5 and footnote.

Ibn Ishāq (d. 767) wrote a biography of the Prophet, which is the oldest historical work extant; the original of this work is lost, while an edition by Ibn Hishām survives (text ed. by F. Wüstenfeld, Göttingen, 1858-60; German translation by Weil, Stuttgart, 1864). The merit of this early historical work lies in the study of the earlier traditional Arabian authorities. Much of the chronological material of this era is defective. Of the earlier Arabian historical writings was the *Futūh Misr* of Ibn Abd Al-Hakam (d. A.D. 871). MSS. of this work in London, Paris, and Leyden have recently been published by the Yale University Press.¹ This work has been printed for the first time in the original text and is the earliest surviving narrative from Arab sources of the Mahomedan conquest of Egypt and the West. Another work in English is entitled *Ancient Accounts of India and China, by two Muhammadan Travellers, who went to those parts in the ninth century*, translated from the Arabic, by the late learned Eusebius Renaudot (London, 1773). The interest of this work lies in the statement that it is a translation from the Arabic MSS. of Abulfeda and Abū Zeid² who lived about the year 851: the MSS., says Renaudot, were in the library of the Comte de Seignelay (c. 1770). That of Abulfeda is but a fragment of his writings. Both these Arabic scholars travelled extensively in Asia and their observations include the study of climate, diet, beverages, and medicaments, among which ambergris, musk, and coco-nut oil figure prominently. Renaudot, in his review of the information conveyed to the Caliphate by these two Arabian scholars, on

¹ *The History and Conquest of Egypt, North Africa, and Spain; known as the Futūh Misr of Ibn Abd Al-Hakam*. Edited from the Manuscripts in London, Paris, and Leyden by Charles C. Torrey (New Haven, Yale University Press; London, Milford).

² The identity of Abū Zeid is not clear. The fruitful Ḥunayn (Johannitius) was also known as Abū Zeid, and lived between the years 809 and 873, and the voyage to China and the Far East took place about the year 851, so that it is conceivable that these adventures formed portion of the career of Johannitius.

the subject of coco-nut oil, writes as follows: "The nut itself affords a sweet, pleasant, and milky liquor, which fermenting, becomes a wine, a vinegar, a sugar, and even a brandy: Its oil is sovereign in cases of erysipelas . . . and many other ailments" (op. cit., p. 75).

Both these works, i.e. the *Futūh Misr* of Ibn Abd Al-Hakam, and the two MSS. of Abulfeda and Abū Zeid, which may be read in English translation, indicate not only the proselyting tendencies of Islam in the ninth century,¹ but the wide net cast by the Caliphs of Baghdad in their efforts to secure the learning of the whole world.

These early Arabian writers were followed by others who largely copied from one another and had princely libraries; and the work of all of these was crowned by that of Ṭabarī, whose *Annals* are on general history from the Creation to the year A.D. 915 (A.H. 302). This work is of great value, and the library of the Fatimid caliph 'Azīz (latter half of the fourth century A.H.) contained, according to Maqrizī, 1,200 copies. That this work was read in Moslem Spain is shown by the abridgment of 'Arib of Cordova, who added to it a history of the West, and continued the story up to the year A.D. 975; a portion of the MSS. of this work are at Gotha. The *Annals* were continued up to the year A.D. 1224 by Ibn al-Athir (d. 1234), and the work of Ṭabarī became the main source and authority of later writers. Of the other Arabic historians may be mentioned Rāzī (d. A.D. 926) who wrote a *History of Spain*, Ibn al-Qūṭiya, who wrote a work with a similar title, Ibn Sa'id of Cordova (d. 1070), who wrote a *View of the History of the Various Nations*, the Spaniard Ibn Pascual, who wrote a *Biographical Dictionary*, Abd-ul-Latīf (c. 1161-1231) who is credited with 166 works, of which many were on medical subjects, al-Qiftī (d. 1248), whose work was considered authoritative, and finally

¹ Renaudot's book, which has been translated into French, is of interest to those concerned with the history of Christianity in China.

Ibn Abi 'Uṣaybi'a (1203-69) who wrote a work entitled *Lives of the Physicians*, which was later translated into Latin. 'Uṣaybi'a was the first medical historian whose work has come down to us: this work, which contains the biographies of the medical men up to his day, has been edited by A. Müller. I shall have more to say under the appropriate chapters regarding Rāzī, Abd-ul-Latif, and 'Uṣaybi'a.

All these works cannot be regarded as genuine history, for like many of the contemporary Jewish legends, they show a great veneration for the marvellous fables associated with the early years of Islam.

The first beginnings of Arabic grammar are found about the latter half of the eighth century of the Christian era, and owes this fact to the respect in which the *Qur'ān* was held and to the contact of the Arabians with the Persians, among the latter of whom, from the eighth century onwards, many outstanding students of Arabic were produced.

The Arabian Period, as far as its literary and medical development is concerned, began in the year A.D. 732, i.e. the year in which the tide of Moslem conquest in the West was stemmed by the Knights of the West of Europe.

The call of Islam from the deserts of Arabia raised the Arabs into a united people under one religious and military commander, and their zeal for proselytism and conquest led to the whole of Arabia Felix becoming one "nation"; Syrian, Persian, and Christian subjects of Islam became welded into one people who came to be known as the Arabians or Saracens, and asserted their teaching and doctrines not only on the rest of Islam, but on the Christians of the Latin West: this was at a time when Christendom was under the practical rule of numerous barons and lords. It is known that prior to the advent of Mahomet, the tribes fringing on the deserts of Syria and Mount Sinai were familiar with the medicine and monasticism of the Christians. In the time of Mahomet, Islam was confined to Arabia Felix;

after his death (A.D. 632) the official leadership (Caliph, Arab. *Khalefat*) fell to Abū Bekr, the father of Mahomet's favourite wife. On the accession of Abū Bekr, the new religion continued to gather strength and Islam spread into Syria among the monotheistic Nestorians, where it came into contact with the Hellenism of the Nestorian monasteries, a fact that has an important bearing on the eventual fusion of Hellenistic and Oriental (including Sanskrit) elements of Arabian Medicine.

Two years later the Caliphate fell to Omar, who made the Mahomedan domination of Syria secure and advanced into Persia ; he also overran Egypt, where he is said to have destroyed the Alexandrian Library.

While in Egypt Islam came into contact with the works of Aristotle which had been transferred there by the Byzantine writers ; the Mahomedans adopted Aristotle's teaching and were later instrumental in spreading it wherever their conquests extended.

Omar died in 644 without completing the conquest of Egypt, and was succeeded by Othman, a son-in-law of the Prophet. Othman completed the conquest of Egypt, and carried Islam into Central Asia. On his assassination in 658, the succession to the Caliphate was disputed by the rival claimants Ali, a cousin (and son-in-law) of Mahomet, and Moawiya, a cousin of Othman ; the followers of these rival factions were known as Shi'ites and Sunnites respectively.

Moawiya and his followers the Sunnites succeeded in coming into power, and after the murder of Ali, Moawiya removed the Caliphate from Mecca to the ancient city of Damascus ; this city had previously been captured by the Moslem general Khālid ibn Walid, and here the great Ummayyad dynasty of Caliphs was founded by Moawiya. The Ummayyads of Damascus made an unsuccessful attempt to take Constantinople, and were much preoccupied with resisting the Shi'ites. Under the Caliph Walid, who reigned between the years A.D. 705 and 715, Islam

once more resumed its active advance, and its forces overran the Mediterranean littoral of Africa, conquered Sicily, and poured into Spain. Its further advance in the West was held by the knight Charles Martel (715–41) at the battle of Tours in 732; the Arabs who had conquered Spain had crossed the Pyrenees in order to assist Duke Odo (Eudes) who had been defeated by Charles at Vincy in 717, but received a crushing defeat from the forces of Catholic Christendom with Charles Martel at their head.

The Moslems who invaded Spain were, as was to be expected, mainly Syrians from Damascus, the city to which the Umayyads of the East had transferred the Caliphate: the main body of these Damascene Saracens settled on the site of ancient Illiberis (Granada), and during the Middle Ages Granada developed into the wealthiest and most splendid city in Spain. This is the city of Alhambra, which is said to be a unique memorial of the power and art of Mediaeval Islam.

In 750 the Umayyad dynasty in the East gave place to that of the ‘Abbāsids, the first of whom was Abūl Abbas. With the accession of Abūl Abbas, the Caliphate was removed to Baghdad. The ‘Abbāsids took as much interest in *learning* as the Umayyads had done in *military adventure*. This zealous search for culture led to Baghdad rapidly gaining in splendour and renown, and the court of Baghdad developed into the wealthiest and most tolerant in the world, and the Caliphs of Baghdad acquired a reputation as patrons of letters and science.

Previous to the wider development of the Arabic language the great body of Arabic tradition was handed down by “reciters” and it was in order to preserve this tradition that the cultured ‘Abbāsīd Caliphs of Baghdad encouraged the use of Arabic script, and also the translation into Arabic of all the Greek, Syrian, and Indian writings that could possibly be obtained by conquest, barter, or purchase. Though not of direct interest to us, the attempt to preserve the teaching of

Mahomet-Mahomet-Mahomet in Arabic, i.e. the language in which he spoke, led not only to the embodiment of the Mahomedan Scriptures in the *Qur'ān*, but to the raising of Arabic as a language of great dignity among the learned of the Middle Ages.

These efforts, succeeding the establishment of the 'Abbāsid Caliphate at Baghdad, culminated in a golden age of Arabic learning in the East, and the period A.D. 750-850 was one of broad tolerance and intellectual curiosity: during this period the Persians exercised a great influence over Arabian Medicine. The translation of the Greek works into Arabic was effected for the most part during this golden age, and the ten Eastern Caliphs who reigned during this period possessed themselves of a vast collection of Greek and other MSS., which they had translated into Arabic, the language of learned Islam. It was not until the eleventh century that we meet with a vernacular literature in Mahomedan lands.¹ Arabic independent medical literature began in the ninth century, and reached its prime in the eleventh.²

The history of the Umayyads in the West is of particular interest to students of the history of Hellenism. With the conquest of Egypt by the Arabs in 640, they gradually spread into North Africa along the shores of the Mediterranean, but owing to domestic troubles, their control of the Berbers, who are said to be akin to the *Lebu* or "Libyans" of Ancient Egypt (as shown in their paintings), was of a feeble character, and it was not until A.D. 665 that a systematic conquest of North Africa was undertaken and the Arab city of Kairawān was founded on a desert site some eighty miles due south of the modern city of Tunis. The Arab writers describe this mediaeval Arab city as having contained luxuriant gardens and olive

¹ E. G. Browne, *Arabian Medicine* (Camb. Univ. Press, 1921), p. 6.

² T. Puschnann, *Hist. of Med. Education*, English translation by H. E. Hare (London, 1891), p. 160.

groves, and from there it was that the "district" of Andalusia was governed until the year A.D. 755. This city was founded, according to the Arabs,¹ before the year A.D. 670, by Okba, and a pretty legend is connected with its selection as the site of what came to be a city of great importance in the Middle Ages. It appears that Okba, when he reached the site, with miraculous power drove away the wild beasts that were there, and planting his spear in the desert sand, he declared to his followers: "Here is your resting place" or "kairawān", hence the name of the city.

North Africa was now divided into three provinces, i.e. Egypt, Africa (Ifrikiya), and Morocco (Maghrib). The Arab domination of North Africa was characterized by the fact that the Arabs and Berbers lived in the main in distinct communities, while each preserved its own language, though in several of the mixed tribes a modification of the Arabic language occurred, and in some instances Berber was adopted as the spoken language. Islam, however, was adopted by the Berbers, who, on the other hand, clung to some of their pre-Islamic superstitions, with the result that Ifrikiya and Maghrib became the home of lost causes, the dim flickers of which, though long forgotten elsewhere, are said still to survive among the descendants of these peoples.

The superior attitude of the Arab aristocracy towards the native Berbers during the hundred years following the foundation of Kairawān, led to North Africa being in a state of perpetual conflict. With the conquest of Spain early in the eighth century by the joint efforts of the Arabs and Berbers, among whom the latter predominated, the rivalry between the two races was carried into the Iberian Peninsula. In short, the Arabizing of the Berbers was and is limited to the conversion of this "white" race to Islam; these two peoples never really amalgamated.

¹ Tabari, ii, 63; Yaqūt, iv, 213.

With the fall of the Umayyads in 750, Abd-ar-Rahman fled from Damascus with a following of Syrians from this city, and the disruption of Islam having found a ready response among the Berbers of North Africa and Andalusia, this fugitive Umayyad sought to re-establish his dynasty among the disaffected African Berbers in North Africa ; failing here, he went to Cordova, where he was more successful among the Spanish Berbers, and established his family in power in Andalusia in A.D. 755. Andalusia up to the time of Abd-ar-Rahman, was a " district " of Ifrikiya, the capital of which was Kairawān.

From now on a new era opens in the literary and scientific history of Islam ; there was an enthusiastic cultivation of the sciences, among which medicine occupied a prominent place. The Arabs' supremacy also comes to an end, for after the year 750, the non-Arabic element in the armies of Islam outnumbered considerably the Arab leaders, while on the other hand, the religion, language, and sciences of the Arabians gradually permeated the entire fabric of the territories under Mahomedan control. This influence also extended to the Jews who were subject to Mahomedan influences, as will be shown presently.

The separation of the Empire of Islam into different spheres of government did not materially interfere with the intellectual intercourse between the Moslem East and West ; for while the Mahomedans looked to the East for intellectual guidance, the Jews, who occupied a peculiar position among the subordinate peoples of the Islamitic Empire, turned their heads to the Rabbinical schools of Mesopotamia until late in the tenth century when a Jewish academy was founded at Cordova and the Jewish centre of learning was transferred from Mesopotamia to Spain.

The intellectual intercourse between the Baghdadi and Cordovan Caliphates owes a great deal to the munificence of the wealthy Moslems, whose generous patronage of the arts and sciences led to the Arabic literature of the East finding its

way to the uttermost limits of Moslem influence in the West of Europe. This practice, which owes its origin to the religious promptings of Islam, whereby the donors, as in Christian Europe at a later time, hoped to purchase redemption for their sins, and was aided not a little by enterprising Arab merchants who traded between the two caliphates.

From the ninth to the twelfth century, the Arabic West raised the dignity of learning in Europe and many works were written, mainly at Cordova, by Christians, Jews, and Moslems. Of the Umayyad Caliphs of Cordova, the greatest and most successful was Abd-ar-Rahman III (912-61),¹ who began to rule at a time when the tribal conflict between the Arab aristocracy and the Moslems of native Spanish descent had reduced them to a state of exhaustion. Abd-ar-Rahman, whose ancestors had been content with the title of Sultan, proclaimed himself Caliph on the 16th of January, 929. This Moslem ruler was successful in spite of the Mahomedans and not through their collaboration; and was followed by the Caliph al-Hakam II (961-76).

The period covering the reigns of these two rulers of Andalusia coincided with a veritable golden age in Moslem Spain, which enjoyed a position analogous to that of Greece in the Old World. At this time Cordova, Granada, Toledo, and Seville were the chief seats of learning in Western Europe, and it is owing to the Omayyad Caliphs that the sciences were preserved from extinction in Europe.

The reign of al-Hakam saw the introduction of scientific and philosophical studies in the schools of Andalusia and the knowledge of science and medicine was widely diffused in the Moslem West. The successor of al-Hakam, whose arrival on the throne of Cordova was signalled by a torrent of intolerance, placed a ban on these studies, which failed to suppress entirely

¹ M. Neuburger, *Hist. of Med.*, Playfair's trans. (1910), p. 353; the dates given by Neuburger are misprinted.

the long-promised glory of intellectual development in Moslem Spain. The fusion of races in the West, and the spirit of competition in the following century, found the appearance of a few great men of intelligence. Of these the first was Avicbron or Ibn Gabirol. A century later Avempace or Ibn-Bāyya wrote a commentary on the physical treatises of Aristotle; both these writers represent the early representatives of speculative thought in Spain. These were followed by Averroës, whose doctrines lead up from the "Regimine of the Solitary" of Avempace. Averroës, who was opposed to the combination of religion and science, appealed to the Schoolmen as a philosopher worthy of the ancient (Greek) world.

Medicine was not only preserved and raised to a position of dignity in the West, but it made progress, and its literature, which was not uninfluenced by contact with the Christian West, was considerably augmented. The foundations of the subsequent development of the science of medicine and surgery were laid by such Arabic writers as Ibn Ruschd, better known as Averroës (d. 1198), and Albucasis (d. 1122); these two Arabic writers exercised a great influence over Scholastic Medical Europe in the persons of Roger Bacon (1214-94), Guy de Chauliac (1300-68), and many other Arabists. The influence of Averroës on Roger Bacon and other scholastic philosophers led to Aristotle exercising an authority almost supreme in Europe during the Middle Ages, while that of Albucasis on Guy de Chauliac led to the propagation of Arabist surgery and the confirmation of Galenic anatomy in Europe.

At Cordova the Caliphs built the famous *mezquita* on the site of a Christian (Visigothic) church: this monument of Arabic Civilization was second only to the *Kaaba* of Mecca, and is unique among the religious edifices of the world. It was not until 1236, when the Moslems were retreating before the Christians, that it was transformed into a cathedral, and the Cordovan Caliphate ceased to exist.

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The Arabic ascendancy, however, still maintained itself in the extreme South of Spain where the Moors tenaciously held the kingdom of Granada. This Islamic State lasted from 1238 to 1492, on the 2nd of January, of which latter year the last Mahomedan ruler, Boabdil, formally capitulated to the Christian forces and Western Europe was freed from the rule of Islam.

The subject races of Islam in the Iberian Peninsula, such as the Christians and Jews, towards the latter part of Moslem rule in the West, were drawn together by a common bond of subjection and danger, and while they had a deeply rooted desire to emulate their masters in the matter of Arabic learning, they had no leaning towards their religion. The religious tendency among the Christian population of Spain, owing to the presence of the militant and later intolerant nature of the last few Caliphs of the West, led to a sense of "nationality" being developed among the Spanish Christians, and this zeal culminated in what came to be known as the 'Spanish Inquisition' in the year 1478, which was followed fourteen years later by the submission of the last Mahomedan ruler in the extreme South of Spain.

The Caliphate of Baghdad, which passed through many wars and insurrections, was finally overthrown in A.D. 1258 by the Mongol Hulagu. The Egyptian Mamelukes who repelled the Mongol invasion kept a puppet 'Abbāsid Caliph until the conquest of Egypt by the Ottomans in 1517, after which the succession was assumed by the Turkish Sultans.

With the twelfth century, we find the decay of the liberal intellectual activity in Islam. The increasing ascendancy of Turkish races and their intolerance (a characteristic, it must be acknowledged, of most proselytes) was the first cause of the growth of this inhibitory influence among the Muslims. In the year 1192, i.e. before the Mongol invasion, a library of books on philosophy was burned by command of the Caliph Mostanjid ;

and some four decades later the books of a physician of Baghdad were publicly burned, while the practitioner himself was incarcerated. Thus, while ethnic philosophy began to find a home in Latin Europe, the orthodox reaction of Islam reduced the Arabic philosophers and physicians to silence.

The final overthrow of the Mahomedans in Spain was due to two causes, i.e. the orthodox reaction and political decadence owing to the Mongol invasion of Asia Minor, when Hulagu overran the territory of the last actual 'Abbāsid Caliph of Baghdad and reduced its literary wealth to ashes; the percussion and repercussion of this disaster to Arabic Culture found a vibrant cord under the reactionary Almohades who were then masters of Moslem Spain.

The orthodox reaction led to the persecution of Averroës and Maimonides, both of whom deeply influenced Western Medicine.

The Arabic works of the Eastern Caliphate had come to form an important portion of the medical literature of the Moslem schools of Spain, and this literature entered Latin Europe mainly through the gates of the Western Caliphate; thus it is essential, if only for the influence of Avicenna's *Canon* which, though produced in the East, found its way through the great translating centre at Toledo to the schools and universities of Europe. We may therefore briefly discuss the medicine of the Eastern Caliphate.

Arabic literature and science find their roots in the Greek works, and the Arabs in a great measure owe their acquaintance with Greek learning to the heresy of the Syrian Nestorius, who was the Patriarch of Constantinople. The Nestorians taught chiefly at Edessa in Mesopotamia, which became the leading centre for the teaching of medicine, but being persecuted by the orthodox Christians they fled to Persia, where their theology was more happily received, and where they developed

the School of Gundê-Shāpūr,¹ which may be described as the true starting-point of Islamic Medicine. Of this school nothing now remains beyond the name; it has been located on the site of Shah-Abad in South-West Persia. The Nestorians from Byzantium in the fifth century and the Indians from over the banks of the Indus met and fused at this famous medical school. The Nestorians had with them Syriac translations of Hippocrates and Galen which are said to have been prepared by Sergius of Ra'su'l-Ayn ² (early sixth century), while the Indians introduced the game of chess which later, if we accept *The Arabian Nights*, became a portion of the necessary armamentum of the Arabian physicians. The Syriac literature of Gundê-Shāpūr, of which very little survives, was the main source of the Arabic translations of the eighth and ninth centuries, and thus the Arabians incorporated themselves with the history of Hellenism at the point where Gundê-Shāpūr laid it down.

At the time of the birth of Mahomet, the school of Gundê-Shāpūr was at the height of its fame, and the familiarity with the Greek Culture of the Syrians bordering on the Arabian Desert and its appreciation by the Moslems led to this medical school coming into great prominence after the Arab invasion of South-West Persia in the seventh century.

The origin of Gundê-Shāpūr is of interest; it was founded by the Sasanian Shapur I after he defeated the Emperor Valerian and sacked Antioch; he named it *Veh-az-Andev-i-Shāpūr*, which means "Shāpūr's better than Antioch"; this eventually became condensed into *Jundī-Sābūr* (Arabic) or *Gundê-Shāpūr*.

The chequered career of the Nestorian movement and its travel from the Greek centre in Byzantium, through Syria and

¹ J. H. Baas, *Outlines of the Hist. of Med.*, English trans. by H. E. Handerson (New York, 1889), p. 218.

² Sergius of Ra'su'l-Ayn (d. 536) translated a considerable part of Galen into Syriac, the MSS. of which are in the British Museum. *MSS. Addit.* 14661, 17156. He is also credited with original treatises on medicine, philosophy, and astronomy.

Persia, left behind a taste for Greek learning among the people it came in contact with, so that we may trace Greek Medicine along the shores of the Tigris and Euphrates to South-West Persia, from whence it moved to Baghdad and, with its Oriental accretions and Arabic rendering, became the Arabian Medicine with which we are concerned.

John the Grammarian (who is referred to elsewhere) and Aaron the Presbyter, who was also an Alexandrian, lived at the time of Mahomet (c. 622). Aaron compiled thirty books in Syriac, the material for which was derived chiefly from the Greek; these books were called the *Pandects* of Aaron and were said to have been translated into Arabic c. 683 by the Syrian Jew Maserjawaihi;¹ this is of interest as it is the first definite attempt at the transmutation of the medicine of the Greeks into that of the Arabians.

The mode of transfer of Greek Medicine to the Arabians may be summarized as follows: the Persians, Arabians, and Jews of Asia Minor were early in contact with the Greeks of Alexandria. The Nestorians, who had a school at Edessa in Mesopotamia, as a result of religious persecution in A.D. 489, fled to Gundê-Shâpûr, where they Hellenized the school which was later destined to be the birthplace of Arabic Medicine. The Nestorians and Jews translated the Greek works into Syriac, and this, says Baas,² explains the frequent corruption of sense, particularly of the works of Aristotle; regarding these corrupted translations, the fact that the Greek works passed through the narrow cloisters of the Nestorian monasteries was not without its influence on the Syriac rendering passed on to the Arabians. A further impulse to the movement of Greek Medicine eastward was received in A.D. 529, when Justinian I banished the "heathen philosophers" from Athens and

¹ J. Freind, *The History of Physick* (London, pt. ii, 1750), p. 9.

² J. H. Baas, *Outlines of the Hist. of Med.*, English trans. by H. E. Handerson (New York, 1889), p. 218.

Alexandria, and thus Greek Medicine and Philosophy were more widely and firmly established in Persia, where the tolerant "barbarian" Chosroës then ruled.

Very little is known of the medical organization that prevailed among the inhabitants of Arabia from the fourth to the sixth centuries, beyond that the medical teaching of the Nestorians of Edessa, which was based on Greek learning, was greatly esteemed by the people of Mesopotamia, and that the Arabians had physicians living among them who had received some of their education from the Nestorians. It is, however, presumed that the medical system of the Arabs and kindred peoples was much the same as that prevailing under the Byzantine Empire during these centuries.

The prophetic activity of Mahomet in A.D. 612 led to the encouragement of the Nestorians, who later took an active part in the great translating movement into Arabic. Some of the Caliphs were even more tolerant than their Christian contemporaries and received, without distinction of creed or race, all men of merit who took refuge in their state.

The transference of the Caliphate to Baghdad led to its becoming not only the centre of Arabian Science and Literature, but also a great city. At one time, we are told by Gibbon, there were 860 licensed physicians and numerous hospitals and schools in the city of Baghdad.

Of the enlightened Caliphs of Baghdad, Hārūnu'r-Rashid embellished his capital with schools and hospitals; Al-Ma'mūn founded the Academy of Baghdad and had a diligent search made for the writings of physicians and philosophers, and these he had translated into Arabic; many of these writings consisted of the Syriac translations of the Greek works that were then obtainable at Gundê-Shāpūr. It is known that Hārūnu'r-Rashid sent an ambassador to his contemporary Charlemagne, and Al-Ma'mūn's broad-mindedness will be appreciated when it is realized that his principal translator and interpreter was

the Nestorian Ḥunayn ibn Ishāq, who was a famous and productive Arabic translator. According to the *Fihrist* (*Index of Sciences*), an Arabic work of the year 987, we find that Ḥunayn translated seven of the ten Hippocratic works mentioned and that the remaining three were translated by his pupil Isa ibn Yahyā; and that Ḥunayn and another pupil, Ḥubaysh, translated the "sixteen books" of Galen.

Ḥunayn translated ¹the following of Galen's works, though the works to be now mentioned must not be looked upon as exhaustive: *De elementis*; Galen's commentary on Hippocrates' *Regimen Acutorum* III Tr.; *De secretis*; *De complexionibus* (*temperament*); *De Malitia complexionis diversæ*; *De simplici medicina* Tr. I-IV (possibly also translated by Yahyā ibn al-Batrik); Galen's commentary on Hippocrates' *Prognostica* and *Tegni* (*Ars parva*). The Arabic translator of Galen's *De crisibus* remains anonymous.

Of the Arabic translators from the eighth to the twelfth century the two Christians, Mesuë Senior (777-857) and Ḥunayn ibn Ishāq or Johannitius (809-973) were the most prominent; while the others include Ḥubaysh ibn el-Hasan, who was a nephew of Johannitius, and Isa ibn Yahyā, another of his pupils; besides these, the translators of note include Kosta ibn Luka and Thabit ibn Kurra of Harran.

It is to the credit of the Arabic translators that Galen's *De anatomicis administrationibus*, of which the *Fihrist* mentions "sixteen books", but of which the first nine only are extant in the original Greek, that books x-xv are still preserved to us. The Arabic MSS. of the latter are in London, Oxford, Dublin, and Paris and are given in detail in Chapter II of this volume. An interesting and possibly important fact that may be taken into consideration regarding these "sixteen books" is that some twelve decades (A.D. 529) before the Mahomedan conquest

¹ M. Steinschneider, *Die europäischen Übersetzungen aus dem Arabischen* (Vienna, 1904), p. 18.

of Egypt, the Christian emperor Justinian had closed the *heathen* (Greek) schools of philosophy at both Athens and Alexandria, but that owing to the work of Yaḥyā an-Naḥwī (John the Grammarian) and others, the Greek school of medicine was once more in a flourishing state when the Muslims arrived at Alexandria. At the time of the Arab invasion (A.D. 640) the medical curriculum at Alexandria consisted of sixteen selected books of Galen, which formed the basis of explanatory lectures, so that it is equally possible that the sixteen books of Galen referred to in the *Fihrist* as having been translated into Arabic by Ḥunayn and Ḥubaysh, may quite equally refer to others besides Galen's work on anatomical administration. The material available, however, points to the assumption that the Arabians preserved all the Greek writings that were not destroyed by the Christian fanatics of earlier times, and that those that were not translated into Arabic were lost before the rise of Islam. Thus we see that Arabian Medicine rated at its lowest deserves careful study, for only thus may we hope to elucidate the many obscure points in the Greek texts extant.

The significance of the Greek, Latin, and Arabic MSS. of Galen's work on anatomical administration has been discussed in my paper on "Galen, the Flower of the Anatomical School of Alexandria, with special reference to his works translated into Arabic, and the Greek, Latin, and Arabic MSS. of his work on Anatomical Administration, and the inference to be drawn therefrom" (*Proc. of the Third International Congress of the History of Medicine*, London, 1922). An unpublished English translation of this work of Galen's by the late Dr William A. Greenhill (1814-94) has lain at the Library of the Royal College of Physicians for many years, while a later writer, Max Simon, published a German translation with the Arabic text and full *apparatus criticus* in 1906.

Of the great physicians of the Eastern Caliphate were Rhazes

(860–926), Haly Abbas (d. 994), and Avicenna (c. 980 or 985–1037), all of whom were Persians.

With Rhazes we arrive at the maturity of Arabian Medicine ; the Arabians developed the ancient doctrinal systems by pursuing them to their logical issues, to which they added their experiences, and made the whole applicable to their day. The Arabic range of vision later formed a stepping-stone to the Scholastics of Europe, thus justifying the statement that the Arabian Period was an ascending era as compared to the Alexandrian, which was one of descent.

Arabic Medicine in its social and clinical aspects is well illustrated in Burton's *Arabian Nights* ;¹ the story of Abu al-Husn and the slave girl Tawaddud would suggest that the physician under Mahomedan rule had to be acquainted not only with Arabized Greek Medicine, but with theology, law, philosophy, astronomy, astrology, music, and chess. The physician was expected to be acquainted with the works of Galen and to have a knowledge of the Galenic System of Medicine, as exemplified in the *Isagoge* of Ḥunayn ibn Ishāq (Johannitius) ; this work was one of those translated into Latin in the Middle Ages and was a popular introductory medical work in later mediaeval times. It is of interest to note that Tawaddud followed the Talmud in regard to the number of bones, i.e. 248, and mentions the four humours and the effects of the planetary conjunctions. Diagnosis was based on six canons, the patient's actions, excreta, nature of pain, its site, swelling, and the effluvia of the body.

The Academies of the Arabians were true imitations² of the School of Alexandria ; and though the more educated and prominent of the Arabic scholars of Islam upheld the prestige

¹ Sir R. Burton, *Arabian Nights*, vol. v, pp. 218–27 ; *Nights*, 449–54, ed. Macnaghten, vol. ii, pp. 512–21.

² J. H. Baas, *Outlines of the Hist. of Medicine*, English trans. by H. E. Handerson (New York, 1889), p. 220.

of the medical profession, the rank and file, according to Rhazes,¹ practised a great deal of trickery, and hired confederates who posed as patients who had made remarkable recoveries, while magic and similar deceptions, all of which were supported with the eye impression conveyed by high turbans and rich and long sleeves, covered a mass of gross superstition and ignorance.

The sources of the Arabic learning may be epitomized as follows: their Greek medicine was derived from the Nestorians, a host of practical methods they derived from the Jews, and Egypt and the Far East gave them their astrologic lore. After the followers of Islam had satiated their lust for conquest, they developed a great enthusiasm for learning, and all Greek, Egyptian, Indian, and Jewish culture that was not opposed to the teachings of Mahomet was eagerly absorbed and preserved in Arabic script. The works of Galen and Aristotle in particular appealed to them. The Arabized Aristotle was carried to Spain in the eighth century, and throughout the Moslem occupation of the Iberian Peninsula, Arabized Aristotelianism, as represented by the *Kitab-al-Kullyyat* of Averroës (of the Western Caliphate), flourished: this work, when it reached Latin Europe, produced a reawakening of interest not only in Aristotle but in Greek culture generally.

The late classical age saw the rise and development of two systems of philosophical thought. Stoicism assumed that the microcosm, man, reflected the macrocosm, the great world around it, and that the interplay between the two forces was theoretically understandable. There appears to have been some doubt in their minds as to how and to what extent man reflected these influences, and both Stoicism and Neo-Platonism were much exercised over these hypotheses. These and other ideas culled from many sources were handed down to the Latin

¹ W. A. Greenhill's English trans. of Rhazes' *Liber de variolis et morbillis* (Sydenham Society, London, 1848); also M. Neuburger's *Hist. of Med.*, Playfair's translation (1910), vol. i, p. 363.

world in a corrupted form, and formed the basic scientific doctrines of the Middle Ages of Europe (Singer).

Similar doctrines were held in the Byzantine world, but in a less corrupted form, and with the rise of Islam these were absorbed by the Arabic scholars, and during what is known as the Age of 'Arabic Infiltration', were passed on to Latin Europe, so that the so-called Arabian Learning, in so far as it relates to Greek Culture, is one more of degree than of dogma.

It was through the Arabic writer Averroës, "the perfect and most glorious physicist," that Christian scholastics acquired much of their knowledge of Aristotle, while Albucasis and Avicenna interpreted Galen to Latin Europe, and the Moslem Geber (Jābir ibn Ḥayyān جابر بن حیان) acquainted Europe with the alchemy of the East.¹ It was believed that there was an occult connexion between the planets and metals, as well as between the various parts of the human body. The influence of this belief in Latin Europe is seen in such terms as Lunar Caustic and Martian Preparations. The alchemy of Jābir ibn Ḥayyān² (702-65), who is said to be one of the *alumni* of Harran, was the parent of modern chemistry. A number of ordinary

¹ The cult of Tao was early associated with a search for the Elixir of Life and the Philosopher's Stone. The ample evidence of the communication between the Greeks of Byzantium and the Moslemized Arabians of the early Middle Ages with the Chinese, would explain the striking resemblance we find between the jargon of the Taoists of China with the writings of the alchemists of Western Europe; separated as the Chinese and European alchemists are by a great distance of time, and the evidence shown in this volume of the influence of Arab writings on the alchemy and the art of healing of Mediaeval Europe, we are compelled to look upon alchemy, which is the parent of modern chemistry, as having its source among the Chinese, who date their science of medicine from the time of the legendary Yellow Emperor. In any case the oldest of the books attributed to the Yellow Emperor which are extant, and which provide a summary of medical knowledge accumulated from the remotest past, were compiled several centuries before the Christian era.

Those who are interested in the History of Chemistry are advised to read Berthelot's *La chimie au moyen âge* (Paris, 1896).

² E. G. Browne, *Arabian Medicine*, p. 15.

chemical processes, such as distillation, sublimation, calcination, and filtration, were known and commonly practised by the Arabs.¹ To Geber falls the credit of having discovered nitric acid and aqua regia; both of these were largely used some eight centuries later by the "chemical mystics"; the former wrote at least one treatise on alchemy; his *Philosophia Orientalis* mentioned by Averroës and Roger Bacon, of which, however, no trace remains, though some apocryphal chemical treatise by him survive. The Arabic words *al-kimiyā* and *al-iksir* were originally synonymous, and each was used to denote the agent by which the baser metals could be transmuted into gold or silver; later the term *al-kimiyā* became restricted to indicate the art of transmutation (alchemy), whereas the term *iksir* or *al-iksir* continued to denote the medium by which the transmutation was effected (*elixir*). The philosopher's stone is first heard of in the Latin West in the twelfth century; previously to that, the Greek and Arabic writers contented themselves with affirming their ideas of transmutation, without indicating how it might be accomplished: the "universal medicine" and the "elixir of life" were products of a later age, though, as stated, the "elixir of life" was mentioned by the Chinese long before the Christian era. The extent to which the Arabs borrowed their material on alchemy from the Chinese still awaits investigation.² In 133 B.C. alchemy,

¹ That this assertion is not undisputed is shown in Thorpe's *Dictionary of Applied Chemistry* (London, 1921), vol. i, p. 91, where the following occurs: "Contrary to the usual statements, alcohol was unknown to the Arabian chemists. The process of distillation was also unknown in Asia. The discovery of alcohol probably took place in Italy. It was first mentioned in an Italian work of the ninth or tenth century (Lippman)."

Among the great majority of historians who have expressed an opinion in keeping with that of the writer is T. Puschmann (cf. his *Hist. of Medical Education*, English trans. by E. H. Hare, London, 1891, p. 179).

² The Moslems first settled in China in the "Year of the Mission" (A.D. 628), while al-Manṣūr sent 4,000 Arabs to China in 755 and the most of these settled in the Far East.

which was then an ancient art in China, received imperial sanction and the Chinese dynastic annals show that herbs and metals compounded in the crucibles of the Chinese alchemists very often led to disastrous results on those who sought the death-defying potions. It is held that the idea of a "universal medicine" had its origin with Geber, but this may be due to a misreading of his words, which in reality may have had reference to the transmutation of metals. At first alchemy was regarded as a branch of the art of healing, and its professors were invariably physicians who occupied themselves in the preparation of chemical medicines.

In addition to the preparation of chemical medicines, the Arabs introduced a large number of ~~new medicaments~~ into their materia medica, as a result of their travels and investigations in many strange lands, having penetrated as far East as Borneo and China; these medical weapons included ambergris, camphor, cassia, cloves, mercury, myrrh, nutmeg, senna, and sandalwood (which suggested the name "sandalani", a character later represented by the apothecary of Europe). The Arabians not only invented the apothecary, but developed the latter's art, by introducing such valuable pharmaceutical preparations as syrups, juleps, alcohol (all Arabic terms), and tragacanth; they also embellished, as it were, the art of dispensing, by introducing scented waters such as those from the rose and orange among a host of others. Further, the Arabs established hospitals and lecture-rooms at Damascus and Cairo, and these enlightened measures found a parallel under the Umayyads of Spain. Moslem Spain under these Caliphs enjoyed the learning of Baghdad without its oppressive despotism. It may, however, be noted here that there were hospitals in Europe¹ in the sixth century, i.e. before the influence of the Arabians had begun to be felt in Christendom; these hospitals were at Lyons and

¹ J. H. Baas, *Outlines of the Hist. of Med.*, English translation by H. E. Handerson (New York, 1889), p. 224 and footnote 2.

at Merida (on the Guadina in Spain), and as Puschmann says¹ the system of treating the sick in institutions such as these is not an exclusively Christian product; the Arabs developed the hospital on efficient lines.

A characteristic of Mahomedan Medicine was the humane treatment of the insane; this is all the more notable as in the Middle Ages in Christian Europe the mentally defective were not too considerably treated.

The possibilities of ~~anæsthesia~~ by inhalation were known to the physicians of Islam.² *The Arabian Nights* contains references to anæsthesia by this method; the influence of this Arabic knowledge was not without its effect on their surgery. Theodoric of Bologna (1206-98), whose name is associated with the "soporific sponge", got his formula from Arabic sources; the sponge was steeped in aromatics and soporifics and dried; when required for use it was moistened and applied to the mouth and nostrils. The "soporific sponge" of the Arabs was one of the causes of their surgery tending to rise above the level of the travelling mountebank, while on the other hand, the surgery of contemporary Latin Europe, i.e. before the time of Theodoric, tended to fall into the hands of uncultivated charlatans.

Cordova became not less distinguished for its learning than Baghdad, enjoying as it did a more liberal government than that of the 'Abbāsid Caliphate. Moslem Spain gave the world many writers from the ancient towns of Malaga, Almeria, and Murcia. The noble University of Cordova was formed in the eighth century, and though a progressively Mahomedan centre, the lustre of its *alumni* added to its magnetic attraction. The scholars of Christendom sought "Sarracenic studies", and

¹ T. Puschmann, *Hist. of Med. Education*, English trans. by E. H. Hare (London, 1891), p. 145.

² *Hua T'o* (the Hippocrates of China) is said to have used anæsthetics for his surgical operations, and though the drugs employed cannot be identified with certainty, they probably were compounded of aconite, datura, and henbane. Hua T'o died in A.D. 220.

despite the fact that these were looked upon with some misgiving by the priesthood, gradually assumed a dominant position in intellectual Europe.

The city of Cordova, while the seat of the Western Caliphs, was known as the 'centre of religion', the 'mother of philosophers', and the 'light of Andalusia'. At the height of its glory under Islam, it is said to have contained 300 mosques, 200,000 houses, and about 1,000,000 inhabitants, besides 50 hospitals. The library of Cordova is estimated to have contained at least 225,000 volumes.

The Caliphs of Cordova between the tenth and thirteenth century established princely libraries at Toledo, Seville, and Murcia, in addition to the one in Cordova.

The literature of the Arabians, both East and West, was characterized by a solidarity which, starting from the theological schools, permeated the entire Muslim world, and was fully expressed in the medical and philosophical literature even to the remotest parts; so that the library at Cordova was but a reproduction of that at Baghdad.

The great collection of Occidental and Oriental literature which was in Arabic script, rapidly passed from mere translation to paraphrastic popular rendering, while textual exposition awakened an independent line of thought in keeping with the national spirit of the times. Arabic civilization in its prime is said to have surpassed ¹ that of Ancient Rome in animation and variety, while Western Islam occupied a position in some ways analogous to that of Ancient Greece. Under the Cordovan Caliphs, the Civilization of Islam underwent an Occidental modification ² owing to its relationship with the Spanish Christians, while maintaining an active and intellectual connexion with Baghdad.³ This contact was in the main confined to the Spanish Jews, for the Muslims of Spain had a tendency

¹ M. Neuburger, *Hist. of Med.*, Playfair's trans. (1910), vol. i, p. 354.

² *Ibid.*, p. 353.

³ *Ibid.*, p. 354.

to adhere to the rigid orthodoxy of the *Qur'ān*, in the limited medical teaching of which they found their requirements. The medico-philosophical speculation of the East, however, found a ready reception among the Jews of Spain, and thus it was that both Muslims and Jews looked to the East for guidance. The lives and writings of these indicate that Moorish Spain considered a visit to the East a necessary portion of a full and complete education. It was through the Spanish Jews that the Spanish Muslims were brought into contact with the philosophy of the East, and it was they also who, when the intolerance of first the Moors and later the Christians of Spain drove them from the Iberian Peninsula, brought the philosophical works of Aristotle and Averroës (the great Arabic commentator of Aristotle) to the Latin West. It is of interest to record that it was not until sometime during the last two decades of the tenth century, that with the establishment of a Jewish academy at Cordova by Hasdai ben Shabrut that Jewish scholarship was transferred to Spain from its former centre in the academies in Mesopotamia. It may be mentioned that by the middle of the tenth century, Arabic had replaced Aramaic as the speech of the Jews.

The teaching of Islam, in accordance with the *Qur'ān*, confirmed the belief in miraculous cures and "medicine was tolerated"; the orthodox reaction in the thirteenth century saw the rapid disappearance of speculative thought among the Arabic writers of the West. After the fall of Cordova in 1235 and of Baghdad in 1258, Arabic Medicine ceased to give birth to new works. The Moors of Spain, however, still continued to practise under the veil of Christianity.

A characteristic of the teaching of the Arabic Schools of Spain was that "dialectic tournaments" were customary among the students and also among the teachers; this practice was introduced with renewed vigour among the High Scholastics of Mediaeval Europe, through the Western Caliphate. The practice of these disputations was thus not an entirely new idea

to the Latin West, and it is to this custom that we owe the modern practice of demanding Theses and Dissertations from aspirants to University Honours.

Although we have called this space of time "the Arabic Period", it can with justice be termed "the Jewish Period", as the Jews were closely identified with the medical culture of Islam in general and the Western Caliphate in particular. The uncompromising belief in monotheism together with the analytic cast of mind, intensive mode of thought and "appreciation of values" that was common to both Moslem and Jew, created a bond of sympathy between these two peoples of Spain. The Jewish-Moslem medicine of the Western Caliphate had a tendency to despise the charms, amulets, and saintly relics of the Christians, while on the other hand, the Christian scholars who were under the intellectual domination of tradition and the priesthood, found many of their number wending their way to Moslem Spain in order to secure translations of the Arabic works.

The Jews often occupied positions as court physicians during the Mahomedan occupation of Spain, and took a large share in the development of Arabic Medicine and also in the great *translating movement* which had its chief centre in Toledo: they were utilized by the medical schools of Europe to convey the heritage of Græco-Arabic literature to Europe. In A.D. 1412, they were banished from Spain, and were received at the School of Salerno. Elsewhere in Europe the Jews fared badly; the Council of Vienna in 1267 forbade them to practise medicine, but nevertheless the barons and clergy utilized their services. In the middle of the fifteenth century the Church of Rome put interdictions on Jewish physicians, but lifted them towards the end of the century. It was not until quite modern times when they were admitted to European Universities that the intellectual power of the race once more became available in the persons of such eminent medical men as Henlé, Boas, Romberg, Freud, Unna, Metchnikoff, Friedländer, Haffkine, Neisser, and Ehrlich.

CHAPTER IV

ARABIC MEDICAL WRITERS AND THEIR WORKS

(THE EASTERN CALIPHATE)

During the latter part of the Mahomedan Period, the Arabs embraced the study of medicine with great ardour and translated into Arabic nearly all the available Greek treatises. The study of anatomy, however, was prohibited, so that anatomical dissections were not practised by the Mahomedans and they were obliged to rely on the anatomical descriptions of Galen, and succeeded in increasing the errors of the originals by inaccurate translations.

The zeal with which the Arabic physicians took up the study of medicine, which was naturally based on the writings of Aristotle, Galen, Oribasius, and Paul of Ægina, brought them into high repute everywhere by the early part of the eighth century.

The Arabic medical authors of repute are said to have numbered over four hundred. This chapter will be devoted to those of the Eastern Caliphate, who influenced the trend of medical thought in Europe.

The first of these in order of time was **Yuhannā ibn Māsawayh** [يوحنا بن ماسويه] (777–857), known in Latin Europe as **MESUË SENIOR**, and sometimes as **JANUS DAMASCENUS**, was born at Gundi-Shāpūr where his father was a pharmacist. He was appointed head of the medical school at Baghdad and physician to the Caliph Harūnu'r-Rashīd. He is referred to by Rhazes as the author of various medical works which are now lost in the Arabic; there are nine Latin editions of the works of Mesuë in the British Museum, these are dated 1462, 1479,

1485, 1495, 1497, 1531, 1541, 1603, and 1623. The edition of the *Mesue Opera* printed in Venice in 1603 is illustrated with figures of medicinal herbs, e.g. thyme (p. 41), scammony (p. 48), colocynth (p. 53), and bryonia (p. 76) : all of these are excellently executed.

Mesue Senior also wrote :

(a) *Aphorisms*, of which there is a Latin translation, perhaps by Constantine.¹

(b) *Book of Fevers*, probably not translated into Latin.

(c) *On the Pulse*, not translated.

Hunayn ibn-Ishāq [حُنين ابن اسحق] (809–73), or more fully, ARŪ ZEID IBN-ISHĀQ EL-IBADI, was known in the Latin West as JOHANNITIUS ONAN and HUMAINUS. He was born at Alhira in Irak, and like his master, Mesue Senior, under whom he studied medicine, he was also a Nestorian. He travelled in Greece and learnt Arabic at Basra. His main work lay in the translation of Greek books.

Among his works was—

(a) the *Isagoge* (*Liber introductionis in medicinam*) ; this is of the nature of an original work, and gives a systematic review of the Galenic system of medicine and owing to its popularity as an introductory medical work in the later Middle Ages in Latin Europe, it also contains mediaeval medical theories.

There are no Arabic MSS. of this work extant. It was translated into Latin by Marcus of Toledo (twelfth century, first half). A Latin edition was published at Leipzig in 1497 and Strassburg in 1534 (Argentor). Latin extracts were

¹ Mesue's *Aphorisms* were published together with those of Maimonides at Bologna in 1489 and at Basle in 1579 ; while another Latin translation of this work is Mediolan, 1481, which also contains Rhazes' *Liber ad almansorem*, and the Variation of 1494, 1497, 1500, and Lugd. Bot. 1505 (cf. Steinschneider's *Die europäischen Übersetzungen aus dem Arabischen*, etc., i (Vienna, 1905), p. 39).

published by Fabricius Paulinus and also in the Giunta editions of Avicenna (cf. *Utilissimus liber perstringens isagogas Joannitii*, Leipzig, 1508). A complete English rendering of the Isagoge is given by E. T. Withington in his *Medical History*, Appendix iv, pp. 386-96.

(b) *Ars Parva* of Galen (τέχνη ἰατρική) translated into Arabic by Johannitius from the Syriac, and from the Arabic into Latin by Gerard of Cremona.

(c) A work of pseudo-Galen, *De Clysteribus et Colica*,¹ was translated from the Syriac into Arabic by Johannitius, and from Arabic into Latin by F. Raphelengius (date ?).

(d) *De Malitia Complexionis Diversæ* of Galen, translated into Arabic by Johannitius and later into Latin by Gerard of Cremona.

Johannitius is said to have translated the seven books of Paulus Ægineta into Arabic,² though only the fifth of the Epitome of Medicine is extant in Arabic script (*vide* Ch. II of this work, p. 31).

Johannitius and the school of Arabic translators he gathered round him at Baghdad, translated other works which, however, did not find their way to the Latin West in translation, and the prominent assistant-translators at that time were, according to the *Fihrist* (A.D. 987), ISA IBN-YAHYĀ, who assisted Johannitius in translating Hippocrates,³ while his nephew IIUBAYSH (died 912) assisted him with Dioscorides' and Galen's works. Withington describes him as "the Erasmus of the Arabic Renaissance".

That the Arabic translators led by Johannitius reviewed the works of Galen as a whole, is evidenced by an Arabic MS. at

¹ There are no Greek or Arabic MSS. of this work extant; the Latin MSS. are at Dresden (Dresd. Bb. 92.92; s. xv, f. 392c), and Paris (Parisin, 6865; s. xiv, f. 175b), while the Hebrew manuscript is at Leyden (Scal. 2; s. —).

² J. Freind, *The History of Physick* (London, 1750, pt. ii), p. 18.

³ C. Huart in his *Littérature Arabe* (Paris, 1912), p. 280, mentions the Aphorisms of Hippocrates.

Constantinople, *Aya Sophia* 3631; s. — (Ḥunayn ibn-Ishāq de disponendis scriptis Galeni-Laterculi librorum Galeni antiqui). Two Latin MSS. of this review are extant; *Casinensis* 397; s. xiv, f. 50v is superscribed "Connumeratio librorum Galieni" and *Eton Bibl. Coll.* 127; s. xiv, f. 271b is entitled "Gal. Opera recensentur."

Abū Ya'qūb Ishāq (ob. c. 910), a son of Johannitius also translated Greek works into Arabic, and thus has arisen some confusion over the authorship of their respective works.¹

'Isā ibn 'Alī [عيسى بن علي], more commonly known as **JESU HALY**, was a pupil of Johannitius and a Christian. He practised ophthalmology at Baghdad and as was to be expected of Johannitius' influence, made translations of the Greek works. He also wrote an original work on eye diseases, which was entitled in the Latin translation "Liber memorialis ophthalmicorum" which consists of three parts: Part 1 is devoted to ophthalmic anatomy and physiology, Part 2 describes the external diseases of the eye, and Part 3 describes the external (non-visible) eye affections. There is an Arabic MS. at Dresden (*Fleischer catal. codd. orient. bibl. Dresd.*, p. 36, n. 244), and Latin versions under the title "De cognitione infirmitatem oculorum et curatione eorum", together with the work of Guy de Chauliac, was published at Venice in 1497, 1499, and 1500, and were issued together with other works under the title "Coll. chir. Veneta".

Al-Kindī [الكندي], or more fully **ABŪ YŪSUF YA'QŪB IBN-ISHĀQ AL-KINDĪ**, was known in the Latin West as **ALKINDUS**. He was the only Arabic writer of pure Arab stock, who contributed to Arabian Medicine and Science: all that the genuine Arabs contributed to intellectual advancement was their name and language, and a patronage of learning generally.

Alkindus became physician to the court of the Caliphs al-

¹ Abū Jakub Ishāq is sometimes referred to as Ishāq ibn Ḥunayn (i.e. Isaac, the son of Ḥunayn, otherwise known as Johannitius).

Ma'mūn and al-Mu'tasim at Baghdad, where he enjoyed a very high reputation as a physician, philosopher, astronomer, and mathematician, and died in A.D. 873 at the age of about sixty.

His works include many translations, including Ptolemy's *Almagest* from the Greek, of which he had a knowledge; he is said to have revised the Arabic translation of Aristotle and to have selected the starting-points from which the later Arabic writers on philosophy began their theses; O'Leary states that the particular basis thus selected by Alkindus was the psychology of Aristotle's *De anima*. Like those of his contemporaries, his works were encyclopædic, and he is credited with over two hundred works, including twenty-two on medicine. One of his medical works is known as *De medicinarum compositarum gradibus investigandis Libellus*; it was translated into Latin from Arabic by Gerard of Cremona. This work deals with the preparation and dosage of medicine and is extant in Arabic manuscript. The Latin versions were published as supplements of the *Opp. Mesuës* (Venice, 1558, 1579), Argentor (1531), Padua (1556, 1564), and Lyons (1584). The work of Alkindus has not been published separately. Alkindus prematurely attempted to establish an exact method of prescribing by applying the law of geometrical progression to the Galenic doctrine of qualities and degrees of complicated mixtures. His geometrical prescribing combined with musical harmony is well illustrated in the following:—

Cardamon is	1' warm	$\frac{1}{2}$ ' cold	$\frac{1}{2}$ ' moist	1' dry
Sugar is	2' warm	1' cold	1' moist	2' dry
Indigo is	$\frac{1}{2}$ ' warm	1' cold	$\frac{1}{2}$ ' moist	1' dry
Emblica is	1' warm	2' cold	1' moist	2' dry
Sum	<u>4$\frac{1}{2}$' warm</u>	<u>4$\frac{1}{2}$' cold</u>	<u>3' moist</u>	<u>6' dry</u>

This, according to Alkindus, means that the compound is dry to the first degree. Among his other works was *De Somnorum Visione*, which was translated into Latin by Gerard of Cremona.

Though one of the earliest translators and commentators of Aristotle, his works were supplanted by the *Canon* of Avicenna in the West: Alkindus is still referred to among the Arabs as 'Abū Yūsuf the philosopher'.

The following works translated into Latin by Gerard of Cremona are attributed to Alkindus: *De Aspectibus*; *De quinque Essentiis*; *De Gradibus medicinae*; *De Ratione*; *De Sompno et visione*; while the others were *De Intellectu* (*et intellectu*), translated by Johannes Hispalensis; *De Judiciis* and *De Proportione et proportionalitate* translated by Robert the Englishman; and finally an anonymous group which is comprised in *De Diebus criticis*; *De Affectu projectuque radiorum*; *De Futurorum sententia*; *De Nativitatibus*; *De Nubibus*; *De Radiis stellarum*; *Theorica planetarum*; and *De Venenis*. The two works of Alkindus, *De Impressionibus aëris* and *de Pluvis imbribus et ventis*, were probably translated by Drogon.

With the name of **ar-Rāzī** [الرازي], or more fully **ABŪ BEKR MUHAMMAD IBN ZAKARIYĀ AR-RĀZĪ** (c. 841–926),¹ we arrive at the maturity of the classical period of Arabian Medicine. This writer was known among the mediaeval Latinists as **RHAZES** and also **ALBUBATOR**.

He was the most celebrated ² and probably the most original of the Arabic writers who followed both Hippocrates and Galen in their methods and ideas. His standing was such that his contemporaries surnamed him 'The Experienced'. He was a great clinician and ranks with Hippocrates as one of the original portrayers of disease. Rhazes was borrowed from by

¹ The *Encyclopædia Britannica* (11th ed., 1910–11), vol. xviii, p. 45, makes a mistake as to dates. Steinschneider mentions the year 932 or 923 as the year of his death.

² 'Ali ibn-Rabban of Tabaristan (the Persian province South of the Caspian Sea), who was the author of a work on medicine and philosophy, entitled *Firdawsu 'l-Hikmat* ("The Paradise of Wisdom"), was one of Rhazes' teachers.

Albucasis of the Western Caliphate; this is interesting as the latter takes the next place in originality among the Arabians. As Rhazes of the West and Albucasis were leaders of original medicine, so Avicenna of the East and Averroës of the West were leaders of abstract thought as applied to medicine throughout the Middle Ages of Europe. Rhazes was the first to introduce chemical preparations into the practice of medicine.¹

Rhazes was born at Ray in Khurāsān about the middle of the ninth century of our era; he first pursued the study of medicine at the age of thirty, and having distinguished himself, he was selected as head of the hospital at Baghdad, where he was between the years A.D. 902 and 907. He lived to a green old age, the last two years of which he spent without the use of his sight. A man of broad sympathies and generous to a fault, he died in want at the age of about eighty-two.

He is credited with about 237 works, the greater number of which are lost. The *Fihrist* enumerates 113 major and 28 minor works and two poems, while Ibn Abī 'Uṣaybi'a in his '*Uyunū'l-Anbā fī Ṭabāqāti 'l-Atībbā*' mentions 232; for a full list of these see G. S. A. Ranking's ² *Life and Works of Rhazes*. Of the medical works extant, is a descriptive treatise in ten volumes entitled *al-Kitābu-l-Manṣūrī* [الكتاب المنصوري] which was dedicated to al-Manṣūr the prince of Khurāsān: the Latin translation of this work by Gerard of Cremona was entitled "Liber ad Almansorem". The first book treats of anatomy and physiology and is said by Freind³ to be taken chiefly from Hippocrates, Galen, and Oribasius' *Medicæ collectiones ad Iulianum*, lib. xxiv, xxv; the second book, which is on temperaments, comes from Hippocrates' *De humoribus*, Galen's *De temperamentis*, Oribasius' *Medicæ collectiones*, lib. v,

¹ J. Freind, *The History of Physick* (London, pt. ii, 1750), p. 59.

² *Proceedings of the XVII International Congress of Medicine*, London, 1913; *Hist. of Med.*, pp. 246-68.

³ J. Freind, *Hist. of Physick* (London, 1750, pt. ii), p. 48.

Aëtius, lib. iv, and Paulus Ægineta, lib. i, and contains chapters on 'slave buying'; the third book, on simple remedies, is taken from Hippocrates' *De Diata*, Galen's *De Alimentorum facultatibus*, *De simplicium medicamentorum temperamentis et facultatibus*, Aëtius, lib. i-iii, Oribasius' *Synopsis*, lib. ii-iv and *Medicæ collectiones*, lib. i-v, xi-xiii, xv, and Paulus Ægineta, lib. i; the fourth book treats of the means of preserving health and is based on Galen's *De Sanitate tuenda*, Paulus Ægineta, lib. i, and Aëtius, lib. iii; the fifth book is given to a consideration of skin diseases and cosmetics, and is taken from Galen's *De compositione medicamentorum secundum locos*; the sixth book is on diet for travellers and is also from various Greek sources; the seventh is on surgery and is taken from Hippocrates, Paulus Ægineta, lib. vi, Oribasius' *Synopsis*, lib. vii, and Aëtius, lib. xiv and xv, in this book he exposes the "little arts used by mountebanks and pretenders to physic";¹ the eighth book is on poisons and comes from Paulus Ægineta, lib. v; the ninth, the most influential in the Latin West, is the *Nonus Almansoris* of the later Middle Ages, and is devoted to a consideration of the various organs of the body from "top to toe"; it is taken from Hippocrates' *De morbis*, Galen's *De locis affectis*, *Methodi medendi*, *De compositione medicamentorum secundum locos*, Aëtius, lib. vi-xii, Oribasius' *Synopsis*, lib. viii, ix, and Paulus Ægineta, lib. iii, iv; the *Nonus Almansoris* or *De ægritudinibus a capite usque ad pedes*, was a famous textbook in the Middle Ages and was also the subject of numerous commentaries; it formed a portion of the regular medical curriculum of the University of Tübingen at the end of the fifteenth century, and will be referred to again; the tenth and last book is given to a study of fevers, and is based on Hippocrates, Galen's *De*

¹ *Liber ad Almansorem*, book vii, 27. These make amusing reading and are suggestive of the modern juggler who apparently extracts frogs from the mouth, balls from the back of the head, and large objects out of the nostrils. Rhazes, the great Arabic physician, was heartily opposed to these charlatans.

crisibus, *De differentiis februm*, *Methodi medendi*, lib. iv-x, Aëtius, lib. v, and Paulus Ægineta, lib. vi.

From the preceding it will be perceived that this work was compiled from the writings of his Greek predecessors, and its value lies not so much on its original matter as on its voluminous form, far surpassing even Galen in this respect, and its demonstration of the carrying over of Greek Medicine to the Arabians. Further, as already stated, the ninth book of this work was publicly read in the medical schools of Western Europe for some hundreds of years.

Latin versions of this work were published at Milan in 1481, Venice 1497, Lyons 1510, and Basle 1544: The *Nonus Almansoris* was published separately (together with commentaries) at Venice in 1483, 1490, 1493, and 1497, and at Padua in 1480. The ninth book was also published in Italian under the title *Libro tertio dell Almansore chiamato cibaldore*. J. J. Reiske issued an Arabic-Latin edition at Halle in 1776.

Rhazes' *Al-Hāwī* [كتاب الحاوي] ("Liber Continens"), the largest and most important of his productions, was an encyclopædia of medicine and surgery containing a summary of all the branches of the art and science of medicine in twenty-five books.¹ This work exceeds in bulk the *Canon* of Avicenna and was one of the nine volumes which composed the whole library² of the medical faculty of Paris in 1395: this work like *Liber ad Almansorem*, shows Rhazes a follower of Hippocrates in theory and of Galen in practice. The ninth book of the "Continens" deals with pharmacology, and was a source of therapeutic knowledge in Europe long after the Renaissance.

An investigation of the "Continens" is fraught with difficulties; no complete manuscript exists, and Dr. Browne doubts "if more than half of it exists at all at the present day".

¹ The *Fihrist*, p. 300, enumerates only 12.

² E. T. Withington, *Medical History* (1894), p. 146.

MSS. are to be found at the Escorial¹ library and the Bodleian;² in the latter the most interesting is MARSH 156, ff. 237, 239b-245b, which is supposed to be the seventh book of the *Hāwī*, but agrees better with the seventeenth of the Latin translation. Book vii of the Latin translation is entitled "De passionibus cordis et splenis", while Book xvii is called "De effimera et ethica" (? hectica): this conclusion seems confirmed by a translation made directly from these dozen pages by E. G. Browne.³

The following is an extract :

"Abdu'llah ibn Sawada used to suffer from attacks of mixed fever, sometimes quotidian, sometimes tertian, sometimes quartan, and sometimes recurring once in six days. These attacks were preceded by a slight rigour, and micturition was very frequent. I gave it as my opinion that either of these accesses of fever would turn into quartan, or else there was ulceration of the kidneys. Only a short while elapsed ere the patient passed pus in his urine. I thereupon informed him that these feverish attacks would not recur, and so it was."

The *Hāwī* was a posthumous⁴ work compiled from unfinished notes by Rhazes' pupils. Freind⁵ says that this work was taken chiefly from Aëtius and Paul of Ægina.

Latin editions of the *Hawī* were published at Brescia in 1486, and Venice in 1500 (this edition is in 25 books), 1506, 1509, and 1542. The Brescia edition mentioned weighs over seventeen pounds and contains about 588 pages; this is a magnificent volume.

Rhazes' "Liber de variolis et morbillis" is the oldest and most important original work on small-pox and measles, and

¹ Casiri, *Biblioth. Arabico-Hisp. Escur.*, vol. i, p. 257, etc., §§ 802-4, p. 290, §§ 849-51.

² Uri, *Catal. MSS. Orient. Biblioth. Bodl.*, §§ 565, 607 (?), pp. 135, 142 (?); Nicholl and Pusey, *Catal. MSS. Arab. Biblioth. Bodl.*, § 179, p. 161.

³ E. G. Browne, *Arabian Medicine* (Camb. Univ. Press, 1921), p. 52.

⁴ M. Neuburger, *Hist. of Medicine*, Playfair's transl., vol. i (1910), p. 361.

⁵ *Hist. of Physick*, pt. ii, p. 49.

constitutes a distinct original contribution to medicine by the Arabians. Although he was not the first to write on these two diseases (the early Christian Fathers having vaguely referred to them), yet he was the first to distinguish them one from another and to write a lucid account that was almost modern in its presentation of clinical detail. Neuburger¹ says "on every hand and with justice, (it) is regarded as an ornament to the medical literature of the Arabs". Bouquet and Richter² say that the term *variola* was first employed in the Chronicle of Bishop Marius of Avenches in the year 570. This book is printed in Arabic (Channing's edition, London, 1766, contains both Arabic text and Latin translation). A Greek translation was issued in Paris in 1548, while Latin editions were published in Venice (1498, 1555), Basle (1529, 1544—the latter was a direct translation from Arabic), Strassburg (1549, Argent.), London (1747), and Göttingen (1781). A French translation was published in Paris in 1762. A valuable English translation of this work was published in 1848 by W. A. Greenhill.³

Rhazes' other works include *Taksimu-l-'ilal* or "Division of Diseases" (*Antidotarium divisio morborum introductio in medicam apporismi medici*), was translated into Latin by Gerard of Cremona, and an Arabic MS. is at Venice; ⁴ this work is also known as *Director* and has been issued with those of Maimonides (of the Western Caliphate).

Latin versions of Rhazes (*Rasis Opera*) were published at Milan in 1481, at Venice in 1483, 1490, 1493, (Bergamo) 1497, 1498, 1500, 1506, 1509, and 1510, and at Lyons in 1510. Other Latin versions appeared in London (1747), Göttingen (1781), and elsewhere. In addition to these his works were translated

¹ Playfair's translation, vol. i (1910), p. 362.

² M. Bouquet, *Recueil des historiens des Gaules* (Paris, 1739), p. 18. P. Richter, *Arch. f. Gesch. d. Med.* (Leipzig, 1911-13), v, 325.

³ Sydenham Society, London.

⁴ Assemani, *Catal. dei Codd. MSS. Orient. della Bibliot. Naniana*, vol. ii, p. 238.

into Greek (Paris, 1548), French (Paris, 1763), and Italian (Venice, under the title *Libro tertio dell Almansore chiamato Cibaldone*).

The following tabular statement sets out the works of Rhazes that were translated into Latin and thus influenced Europe :

(a) The "Continens" translated into Latin by the Sicilian Jew Ibn Faradj (Farragut) in 1280.

(b) *Liber ad Almansorem*, translated into Latin by Gerard of Cremona.

(c) *De ægritudinibus præconum*, translated into Latin by an anonymous writer from the Hebrew.

(d) *De proprietatibus membrorum et utilitatibus et nocumentis animalium aggregatus ex dictis antiquorum*, from Hebrew into Latin by an anonymous writer.

(Note (c) and (d) were published in Latin translation in Venice in 1497 by B. Locatellum.)

(e) *Liber divisionum*, translated by Gerard of Cremona.

(f) *Antidotarium*, translated by the Provincial Jew Abraham Kaslari (c. 1349).¹

(g) *De sectionibus et cauteriis et ventris* } anonymous.
(h) *De febribus* }

(i) *Liber de variolis et morbillis*, otherwise known as *Liber de pestilentia*. The following is a list of the Latin translations of the *Liber de pestilentia* that have been published : Venice 1498 and 1555, Basle 1529 and 1544, Argentor. 1549, London 1749, and Göttingen 1781.

Among the other works of Rhazes that were rendered into Latin in the Middle Ages were : *De Aluminibus et Salis*, *Epistola de lepide philos*, *Experimentorum* (Alchemy and Medicine), *Præparatio Salis*, *Lumen luminum* (translated by Gerard of Cremona), and *Explanatio verborum Hermetis*.

¹ Abraham translated the recipes in the *Antidotarium* into Latin (cf. Steinschneider's *Die europäischen übersetzungen aus dem Arabischen*, etc., i, p. 47).

The following saying¹ of Rhazes is not without significance : " When Galen and Aristotle are unanimous in the expression of an opinion there lies absolute truth, but when they are at variance it is hard to decide, and we should arrive at the proper course of conduct by ratiocination," and as a corollary he adds : " The skilled and experienced physician will act upon the promptings of his judgment."

Rhazes was instrumental in introducing the extensive use of mercurial ointments² both among the Arabians and in the Latin West. The great body of Rhazes' writings was lost.

Yahyā ibn Serabi [يحيى بن سرابي] was known in Latin Europe as SERAPION SENIOR, and also JANUS DAMASCENUS. The confusion of Janus Damascenus and Mesuë Senior, who, as already stated, was known in the Middle Ages as " Janus Damascenus ", was due to the falsification of Constantinus Africanus. Serapion Senior was a Syrian by birth and died c. 930. He wrote two books in Syriac, one in twelve, and the other in seven parts ; both of these were translated into Arabic by Musa ben Abraham al-Hodaithi and Ebn Bahbul ; the latter is at the Escorial Library, and was translated into Latin by Gerard of Cremona under the title of *Aggregator*, it was also edited under different names, e.g. *Pandectæ*, *Therapeutica methodus*, and *Practica siue Breviarium*. An Arabic MS. is Bodl. Uri 598, in which Rhazes is cited.³ Baas⁴ says that this work contains a description of a " disease of the head called soda " ; I shall refer to this matter in a later chapter. Serapion, says Freind,⁵ like Rhazes, took his material chiefly from Aëtius

¹ G. S. A. Ranking, *The Life and Works of Rhazes* (XVII Internat. Cong. of Medicine, London, 1913, sect. xxiii) ; *Hist. of Med.*, p. 242.

² E. T. Withington, *Medical History* (1894), p. 148.

³ M. Steinschneider, *Die hebräischen Übersetzungen des Mittelalters* (Berlin, 1893), p. 736.

⁴ J. H. Baas, *Outlines of the Hist. of Med.*, trans. by H. E. Handerson (New York, 1889), p. 226.

⁵ J. Freind, *The History of Physick* (London, 1750, pt. ii), p. 49.

and Paul of Ægina, and unlike most other Arabic writers, transcribed from Alexander of Tralles; ¹ while Rhazes in his "Continens", often quoted word for word from Serapion.²

The Latin translation of Serapion by Gerard of Cremona was published at Venice in 1479; further Latin versions were published at Ferraria (1488), Venice (1497, 1503, 1530, 1550), and at Lyons (1510). A Latin version was issued at Basle in 1543.

Isaac Judæus, or more fully ABŪ YA'QUB IŠHĀQ SULAYMAN AL-ISRĀ'ĪLĪ [أبو يعقوب اسحق سليمان الاسرائيلي] (850-c. 941), was typical of the Jews of his day. Isaac was born in Egypt, where he later practised ophthalmology. He settled at Kairawān and became physician to several Egyptian rulers. Isaac wrote:

- | | |
|--|--|
| (a) A <i>Book of Definitions</i> . | } which were later mistranslated by Constantine the African. |
| (b) A <i>Book of the Elements</i> , translated into Hebrew by the Rabbi Abraham, and into Latin by Gerard of Cremona. ³ | |
| (c) A <i>Book of Diet</i> (his principal work) written in Arabic and translated into Hebrew. ⁴ | |

(d) He probably did not write the *Pantegni*: the attribution to Isaac rather than to Haly Abbas is almost certainly a falsification of Constantine.

The truth regarding the *Pantegni* is probably this: Haly Abbas wrote the *Liber Regius* from which Constantine took a part and changed the title. The translator Stephen of Antioch (1127), who was probably of Anticaria in Andalusia and not

¹ Ibid., p. 42-3.

² Ibid., p. 41.

³ The Latin translation of Gerard of Cremona, together with the other of Isaac's writings, was published at Lyons under the title *Liber aggregatus ex dictis philosophor. antiquor.*, etc. (cf. Steinschneider's *Die europäischen Übersetzungen aus dem Arabischen*, etc., iv, p. 23).

⁴ A Latin translation of Isaac's work on Diet was made (c. 1070) by Constantine, and versions were published at Padua in 1487 and Basle in 1570; the latter is a complete Latin translation, while the former contains but a part.

Antioch in Asia Minor, noticed this, and deliberately charged Constantine with fraud—probably, with justice: Constantine at first claimed the work as his own. Much of his work was culled from Isaac, and so it was thought that this book was also.

The *De Urinis* ascribed to Isaac may be the work of Abd-ul-Latif (d. 1231). Among the other works was *The Physician's Guide*, a Hebrew book of proverbs and aphorisms; in this work he copies Rhazes to a considerable extent. That Isaac was deeply imbued with the true spirit of the medical profession is indicated by his saying: "Let not thy mouth condemn, if any accusation be made against a physician, for to every man comes his hour." ¹

The *Omnia Opera Ysaac* was published at Lyons in 1515.

Isaac justifiably enjoyed great fame in North Africa and exercised no little influence upon the Medicine of the Middle Ages.

'Ali ibnu'l-'Abbās [على ابن العباس], the Persian sage, was known in the Latin West as HALY ABBAS: he was a native of Ahwaz in South-West Persia and enjoyed great eminence fifty years after the time of Rhazes; he died in A.D. 994. His principal work was *Al-Kitābu'l-Malikī* [الكتاب الملكي] (*Liber Regius*), which was a comprehensive compilation on theoretical and practical medicine in twenty books, the material for which was in a large measure taken from Rhazes' *Liber Continens*, and, though founded on Galen, is by no means destitute of originality. This work was intended by the author to occupy a position midway between the voluminous *Continens* and the concise *Liber ad Almansorem* of Rhazes. The Arabic text comprises about 400,000 words and is divided into twenty tracts and subdivided into numerous chapters, of which the first ten deal with theory and the second ten with the practice of medicine. The second and third of these tractates deal with

¹ M. Neuburger, *Hist. of Medicine*, Playfair's transl., vol. i (1910), p. 366.

anatomy and have been published with a French translation by P. De Koning (*Trois traités d'anatomie arabes*, Leyden, 1903). The nineteenth tract, which contains 110 chapters, is devoted to surgery, and it was this section of Haly Abbas' work that was first introduced to Europe through a Latin version of Constantine, although the latter did not mention Haly Abbas' name.

In the first three chapters of the first tract, Haly Abbas discusses the medical writings of Hippocrates, Galen, Oribasius and Paulus Ægineta, and also the works of Aaron the Priest, Serapion, and Rhazes.

Al-Malikī is generally regarded as the best work of the Arabic Period: this 'royal book' was the standard textbook of Arabian Medicine until it was replaced by the *Canon* of Avicenna about a century later. This work has been printed in Arabic at Cairo. The principal Latin editions extant are the Venetian of 1492 and the Lyons of 1523; the former was a translation of Stephen of Antioch which was completed in 1127, while the latter, which was also based on Stephen's translations, was annotated by Michael de Capella, and was published under the title *Liber totius medicinæ necessaria continens, quem Haly filius Abbas edidit regique inscripsit, unde et regalis dispositionis nomen assumpsit*.

Another work of Haly Abbas was *Tractatus de medicina*, which consists of three books (*Liber sanitatis*, *Liber morbi*, and *Liber signorum*); the manuscript is at Göttingen.

Algazirah [الغزير], also known as ABŪ JAFAR AHMED IBN-ABRAHAM ABŪ CHALID, was a pupil of Isaac, and became a physician at Kairawān in Africa; he died in 1004. His *Viaticum peregrinantis*, the Arabic manuscript of which is in the Dresden Library (*Fleischer cat. codd. orient.*, n. 31, n. 209), is a compendium of medical symptoms and treatment. This work was translated into Hebrew by Rabbi Moschen ben Tibbon, into Greek by Synesios, and a portion was rendered into Latin by Constantinus Africanus.

Algazirah was a prolific writer and is credited on the one hand with a work entitled a *Guide to the Poor*, while on the other hand, he is famous for his strenuous holidays, during which he took part in buccaneering expeditions off the African Coast.¹

Maswijah al-Marindi ("Johannis fil. Mesue filii Hamech"), who was also known as MESUË JUNIOR, is said to have been born at Marindi on the Euphrates, to have studied medicine and philosophy at Baghdad, and to have died in 1015. We are unfortunately compelled to depend on Leo Africanus for our information, and thus are still in doubt as to its authenticity. Mesuë Junior (or a Latin scholar of the eleventh or twelfth century who took the name), is credited with a work which is said to have been translated from the Arabic into Latin by a Sicilian Jew, and there are two Hebrew MSS. extant (cf. Steinschneider's *Die europäischen Übersetzungen aus dem Arabischen*, etc., i, pp. 39-40). The reprints and Latin MSS. written under the name of Mesuë Junior during the Middle Ages embrace the following: *Canones generales*, *Simplicia*, *Antidotarium*, *Grabadin medicinarum particularium*; the last named is on the practice of medicine, and consists of three parts; the *Grabadin* was the Apothecary's manual of the Middle Ages. A work on surgery which is said to be based on an original of Mesuë Junior, and appears under the name of Faradj is entitled *Phlebotomia secundum Damascenum* (MS. Exon. Coll. Oxford, 35²⁸).

The *Grabadin*, which is in twelve parts, deals in the main with *materia medica*, and is important as it familiarized Latin Europe with Arabic pharmacy and therapeutics, and many hundred editions were issued in Europe during the Middle Ages. There

¹ This physician and buccaneer was not only emulated but surpassed by the Englishman Thomas Dover (1660-1742). Dover, the inventor of 'Dover's Powder', was educated at Oxford and Cambridge, and practised medicine in London and Bristol; while a captain of a buccaneering expedition, he it was who in 1710 rescued Alexander Selkirk, the original of the immortal Robinson Crusoe (cf. the late Sir William Osler's biographical essay, *An Alabama Student*, 1908).

is great doubt as to the origin of the work mentioned as the Arabic originals have never been found; the very existence of Mesuë Junior is doubtful, as the evidence rests on Leo Africanus, a most unreliable writer; it is considered that a Latin compiler assumed the name. Owing to the mystery surrounding the origin of the writings of Mesuë Junior, he is referred to as "pseudo-Mesuë". Neuburger says that the work bears the imprint of the Arabic Era.¹

The Latin works on materia medica bearing the name of Mesuë Junior were most popular in the Middle Ages, and were among the first medical works to be printed at Venice in 1471. Another Latin version is *Mesuë (Joannis) Medicorum evangeliste opera cum expositione Mondini super canones universales, etc.*, Lugdunen, Stephani Boland, 1515.² The popularity of this work, and the idea that it was of Arabian origin, would indicate the position that Arabian Medicine held in the minds of the Christians of Europe in the Middle Ages. It indicates the influence and position of Arabic teaching in Europe at this time, and suggests that in order to attract attention it was necessary to make believe that the work was of Arab origin, and that works of Latin origin were not considered worthy of the close attention of the 'scholastics' of Europe.

A great number of editions of this work appeared in Latin in the latter part of the fifteenth century and during the whole of the sixteenth century. This period also saw the production of Italian versions at Modena (1475), Firenze (c. 1490), and Venice (1487, 1494, 1559, 1589).

Abū 'Alī Ḥusayn ibn-'Abdullāh ibn Sina (937-1037) was known in the Latin West as AVICENNA [IBN SĪNĀ ابن سينا "Son of Sina"], the 'Prince of Physicians' was born at Afshena in

¹ Playfair's translation, vol. i (1910), p. 370.

² B. H. Blackwell's 188th Catalogue (Oxford), p. 45. This book was sold before the writer was able to send for it.

the Persian province of Bokhara. The most famous of Arabic physicians and philosophers, his influence extended throughout the world of Islam and in the West of Europe, his writings formed the principal reading of the Christian Scholastics. It is claimed that he mastered the contents of the *Qur'ān* at the age of ten years, and also that he devoted his entire time to research. It is said that having failed to understand the "Metaphysics" of Aristotle, after reading it through forty times, he found the key to the work in a commentary by al-Fārābī,¹ which he bought for a small sum. Incidentally, al-Fārābī was the first Oriental scholar to comment on Aristotle's logic.² Having completed his studies in the general sciences at the age of eighteen, Avicenna was appointed Vizier to the Prince of Hamadan and given many honours. But owing to intrigues in the court and a passion for pleasure, he was compelled to flee to Isfahan, where he became court-physician and lecturer on medicine and philosophy; he was unquestionably a man of a high order of mental ability, for at the age of twenty-one he wrote an encyclopædia of all the sciences, excepting mathematics. As a result of over-work and riotous living, he died at an early age, and was buried at Hamadan (ancient Ecbatana): a tiny illustration of his tomb is given in Sir William Osler's *Evolution of Modern Medicine*.³

Among the hundred⁴ books he is said to have written, the most important is [القانون في الطب] *Al-Qānūn fī'l-Ṭibb*: this is an unwieldy collection of medical lore up to his day, and his interpretation of the material he collected; Avicenna surpassed both Aristotle and Galen in dialectical subtlety, and showed

¹ *al-Fārābī*, or more fully Mohomed ibn Mohomed ibn Tarkhan Abū Naṣr al-Farabi, was born at Farab and is said to have travelled widely. He died c. 950.

² Al-Fārābī also wrote on anatomy and the pulse, fragments of which are extant.

³ Op. cit., p. 101.

⁴ *al-Qifṭī*, ed. Lippert, p. 418 (cited by Browne), mentions twenty-one major and twenty-four minor works.

a fondness for metaphysical speculations ; and like all the Arabian writers of the East, he presents us with the doctrines of Galen and Hippocrates modified by the system of Aristotle together with illustrative material from the later medical writers. Avicenna, however, attempted to reconcile the doctrine of Galen with that of Aristotle, just as St. Thomas Aquinas (who was educated at the Arabist centre at Naples), two centuries later, reconciled them with the Church.¹

The *Canon*, or more correctly *Qānūn*, contains about a million words and is excessively divided into major and minor sections ; the whole is divided into five books, the first two of which deal with physiology and hygiene, based on the writings of Aristotle and Galen ; the third and fourth deal with treatment, and the fifth is on materia medica. This work was the final codification of all Græco-Arabic Medicine, and formed half the medical curriculum of European Universities in the latter part of the fifteenth century, and continued as a textbook up to about A.D. 1650 in the Universities of Montpellier and Louvain.

The fame of Avicenna in mediaeval medical Europe rested on the Græco-Arabic system of medicine, which to the scholastics of the Middle Ages were laid upon " foundations apparently immutable ".² Avicenna's elaborate train of reasoning appealed to the Middle Ages when those who could see the most subtlety in a passage from the ancient writers were often esteemed as the most learned so that passages that were obscure or unintelligible were considered sublime. But the reaction set in early and Arnold of Villanova (1235-1312) described Avicenna as a professional scribbler whose misinterpretations of Galen stupefied European physicians. Avenzoar of the Western Caliphate described the *Canon* as " waste-paper ". During the later Middle Ages, however, Avicenna's writings enjoyed a reputation which ranked with those of Hippocrates and Galen.

¹ E. T. Withington, *Medical History*, p. 153.

² M. Neuburger, *Hist. of Med.*, Playfair's transl., vol. i, p. 368.

In this connexion the Latin MS. *Vratisl. bibl. acad. Ac.* 111 Q 4; *xv*, f. 206 (*Breve compendium de melioribus dictis Gal. Avic. Hipp.*) is interesting.

Avicenna was studied throughout the West and even reached the Gaelic speaking people of the British Islands, as has been shown from *The Scottish Collection of Gaelic Medical MSS.*¹ Duncan McConacher, who was probably one of the McConachers of Lorn, commenced a treatise on the 14th of January, 1598, with the purpose of reproducing the teaching of Avicenna in a clear and concise form.

A great number of the MSS. are extant; Osler gives us a beautiful illuminated illustration of a Hebrew MS. of Avicenna in the Bologna Library.²

This work was translated into Latin by the two Gerards of Toledo (Cremona and Sabbionetta), and about thirty editions founded on the original Latin translation were issued in Western Europe. A beautiful Arabic edition founded on a Florentine manuscript was published in Rome in 1593 (*Assemani. catal. codd. MSS. orient. bibl. Medic. Laurent. et Palat.*, n. 215), while the Bulak edition (1294), consisting of three books, appeared in 1877. An incomplete Hebrew version by Nathan Amathi (?), who knew both Greek and Arabic, appeared at Naples c. 1491, but had been translated into Hebrew in 1279. The principal Latin editions are the Milan imprint of 1473, the Paduan of 1476 and 1479, the Venetian of 1482, 1486, and 1500, the Giuntas of 1527, 1544, 1555, 1595, and 1608. The fifteenth century saw the development and collection of a great mass of commentaries around this work, the whole of which were printed by the Giunti of Venice in 1523, under the title "Maximus Codex totius scientiæ medicinæ, etc."

¹ D. Mackinnon, "The Scottish Collection of Gaelic Medical MSS.," *XVII International Congress of Medicine, London, 1913, Sect. xxiii, History of Medicine*, pp. 401-9.

² Sir Wm. Osler, *The Evolution of Modern Medicine* (New Haven, 1921), p. 99.

The influence of the *Canon* on the West was bad on the whole, for it confirmed the idea that the use of syllogisms was better than the first-hand investigation of Nature (Garrison), and it marred the progress of surgery by suggesting that it was beneath the dignity of the physician to practise this 'manual art' beyond the use of the cautery and caustics. The *Canon*, however, in common with other Arabic works which were translated into Latin in mediaeval times, can never have conveyed a true idea of Arabian Medicine to the scholastics of the West, as the investigation of the mediaeval Latin translations shows that these works are teeming with errors.

Among the works of Avicenna that were translated into Latin were *De viribus cordis seu de medicamentis cordialis* (by Andreas Alpagus); *Liber liberationis seu removendis nocumentis, quæ accedunt in regimine sanitatis* (by Andreas); *Canticum (cantica) de medicina seu liber de medicina in compendium reducta* (by Gerard of Cremona); (?) *Tractatus de syrupo acetoso* (by Andreas); *Physica et Metaphysica* (by Antonius); *De animalibus*. His *Philosophia Orientalis*, which was pantheistic in tone, was mentioned by Averroës and Roger Bacon; this work is now lost. His *De animalibus* was translated into Latin by Michael Scott: the Arabic MSS. of both the last two mentioned are lost. His other works which were rendered into Latin by Andreas Alpagus were: *Aphorismi de anima*; *De diffinitionibus et quæsitis*; *De divisionibus scientiarum*; *De Mahad*; and *De medicamentis cordialis*; Andreas also translated the *Canon* (see Steinschneider, *Die europ. Übersetzungen*, i, pp. 11-16, 92). Johannes Hispalensis translated into Latin: *De anima* (a work on philosophy), *De Cælo et Mundo*, *Metaphysica*, and *Opera Philos.* Gundisalvi translated *Sufficientia*.

The Greek translations of Avicenna on the urine are *Paris* 2256, 2260, 2307-2309.

Avicenna, though practical anatomy was closed to him, yet wrote a treatise on anatomy, a French translation of which has

been issued by P. de Koning, together with the anatomical works of Rhazes and Haly Abbas. Regarding Avicenna's sources, Freind says that he obtained his material from Rhazes.¹

These brief remarks on Avicenna would be lacking without a reference to his poems: the work of Drs. Ethe and Browne² and Professor A. Jackson would indicate that in all probability the quatrains ascribed to 'Umar Khayyām (i.e. the poem translated by Fitzgerald) was really the work of Avicenna. 'Umar is stated to have post-dated Avicenna by a century.

Ibn Jazla [ابن جزلة], or more fully ABŪ 'ALĪ JAHIAH IBN-JAZLA BUHALYLHA IBN JAZLA, was born of Christian parents at Baghdad in A.D. 1074, and later became a Mahomedan convert. His *Dispositio corporum de constitutione hominis, Tacuin ægritudinum*, as the name implies, was translated into Latin. There appears to be some doubt as to when he lived; it has been said that he was one of the physicians to Charles the Great (Charlemagne) and that he wrote his *Tables* or *Tacuin* at the instigation of the latter;³ there is no foundation for this tradition. The *Tacuin* was translated by the Jew Farragut and the Latin version was published in 1532 (Argent.) under the title *Tacui ni ægritudinum et morborum fere omnium corporis humani cum curis eorundem Buhahylha Byngezla autore*. A German translation was published at Strassburg in 1533 by Hans Schotte.⁴ It is curious that it has not been published in Arabic, as the Arabic calligraphy of Ibn Jazla was most beautiful. Ibn Jazla also wrote another work which was translated by Jambolinus, and was known in Latin translation as *De cibis et medicinis simplicibus*.

'Abdu'l-Laṭīf [عبد القطيف], or more fully ABŪ MUHAMMAD ABDU'L LATĪF IBN-JŪSUF (1162-1231), was born at Baghdad,

¹ *Hist of Physik*, pt. ii, p. 59.

² E. G. Browne, *Arabian Medicine* (1921), pp. 60-1.

³ C. Egass, *Bulæi Hist. Antiq. Univ. Paris*, T. 573, cited by J. Freind, p. 228.

⁴ L. Choulant, *Bücherkunde für die ältere Medicin* (Leipzig), pp. 369-70.

where he studied philosophy and philology, and later alchemy and medicine. He is said to have met Maimonides at Cairo. During his career he taught medicine and philosophy at Damascus, Aleppo, and Cairo. Of the 166 works he is credited with, many of which were on medical subjects, only one is in print, i.e. *Compendium memorabilium Ægypti*, which was based on his studies and experiences in Egypt, which country he visited at the request of the Sultan Saladin. The Arabic MSS. now in the Bodleian Library were transcribed by Joseph White of Oxford in 1782 and published at Tübingen in 1789 under the title *Abdollariphi compendium memorabilium Ægypti arabice e codice mso Bodleiano edidit D. Joseph White, præfatus est H. Eberh. Glo. Paulus*. An Arabic-Latin edition containing the Arabic text was published by J. White at the Clarendon Press in 1800 under the title *Abdollariphi historię Ægypti compendium arabice et latine partim ipse vertit, partim a Pocockio versum edendum curavit notisque illustravit Jos. White*. A wonderful French translation which was the work of a set of translators appeared in Paris in 1810, while earlier (1790) an indifferent German translation by Wahl was published at Halle. Other editions appeared at about this time by Th. Hunt (1746), J. Mousley (1808), and Sylvestre de Sacy (1803).

Ibn Abi 'Uṣaybi'a [ابن أبي أصيبعة] (c. 1203-69), or more fully MUWAFFAQUDDĪN ABDŪ'L-'ABBAS AHMAD IBN UL-QĀSIM IBN ABI 'UṢAYBI'A, was a contemporary of ABDU'L-LATĪF. The son of an oculist, he was born at Damascus, where he studied medicine, later migrating to Cairo. While at Cairo he was physician to the hospital there: after a short term at this city, he accepted the appointment of physician to the Emir Azeddin in Sarkhar. He has the distinction of being the first historian of Arabian Medicine, and his *Lives of the Physicians* ('*Uyunū 'l-Anbā 'fī Ṭabāqāti'l-Atibbā*), the first edition of which was issued in 1245-6, was later translated into Latin under the title *Fontes relationum de classibus medicorum*. This work

was probably not made public during the author's lifetime : it contains the biographies of the most famous medical men up to his time. MSS. are in the British Museum and at Leyden. This work was the main source of the histories of Wüstenfeld and Le Clerc, and Latin translations by J. J. Reiske are at Copenhagen.

Ibnu'n-Nafis [ابن النفيس], who was known among the Western Scholastics as ANNAFIS, was a physician of Damascus who died in December, 1288. He is credited with a commentary on the *Canon* of Avicenna, entitled in the Latin translation *Compendium Medicinæ*. There is an anonymous Hebræw translation together with the Arabic text.¹ In 1828 this work was published in Calcutta under the title *Moojiz-ool-Qanoon : a medical work by Alee Bin Abee il Huzm, the Karashite, commonly known by the name of Ibn-ool-Nufees*.

¹ M. Steinschneider, *Die hebräischen Übersetzungen des Mittelalters* (Berlin, 1893), p. 722.

CHAPTER V

ARABIC MEDICAL WRITERS AND THEIR WORKS

(THE WESTERN CALIPHATE)

The medical school of the Western Caliphate was both medically and philosophically antagonistic to Avicenna, who is usually regarded as the chief representative of Arabian Medicine. The Arabic writings that emanated from the Cordovan centre of Islam showed a modification, owing to its intimate contact with the Christian West, and the medical and philosophical literature issued by the Christians and Jews of Moslem Spain is based more on the practical realities and attach less importance to dialectic vanities.

The eminent Arabic writers of the Western Caliphate are small in number as compared to those of the Eastern, but their influence on the Latin West was far-reaching. The most of the Western Arabians who reached any degree of eminence date long after Rhazes and Avicenna: the four most eminent of these were Albucasis, Avenzoar, Averroës, and Maimonides, all of whom exercised a great influence over the Scholastics of the Latin West.

Abu 'l-Qāsim uz-Zahrāwī [أبو القاسم الزهراوى] was known in Latin Europe as **ALBUCASIS**, **BUCASIS**, and **ALZAHARAVIUS**; born of Spanish parents (c. 936)¹ at El-Zahra near Cordova, he became physician to Abd-ar-Rahman III (912-61). It is not possible to compile his biography for lack of authentic material.

¹ There appears to be great variance over the dates given for the birth and death of Albucasis (cf. L. Choulant, *Bücherkunde*, p. 372). The dates given by Choulant are not accepted by the author.

His principal work was an encyclopædia of medicine and surgery entitled *Altaşrif* which has been translated five times. This work consists of two parts, each consisting of fifteen sections: those on anatomy, physiology, and dietetics are borrowed from Rhazes, and the work as a whole contains little original matter. The surgical portion of this work was published separately, and was the first independent illustrated work on the subject.

His surgical tracts, which were translated into Latin by Gerard of Cremona, are divided into three books, and are founded on Paulus Ægineta,¹ whose *Epitome*, book vi, was the standard textbook on surgery until Albucasis produced his surgical work. It will be remembered that the seventh book of Rhazes' *Liber ad Almansorem* is devoted to surgery, and was based on Hippocrates and Paulus Ægineta, book vi, as well as Oribasius and Aëtius. The first and longest book deals with the cautery, the extensive use of which in Arabian Medicine is due to the teaching of Mahomet, who, however, recommended that it be used sparingly and with 'caution'; this book is illustrated with figures of cauteries and other appliances necessary for the purpose of cauterization and shows an infectious enthusiasm for the virtues of 'fire'. The second book, which is on general surgery, is largely a transcription from Paulus Ægineta, and describes the operations of lithotrity, lithotomy, and amputations, and also ophthalmic and dental surgery; it also contains the Arabic method of treating wounds, and ends with remarks on suppuration. The third book is on fractures and luxations, and mentions paralysis following fracture of the spine. He also describes the obstetric posture now known as 'Walcher's position'; he also mentions instrumental delivery in parturition, though it is doubtful whether he actually practised midwifery: August Hirsch says that the obstetrics of Albucasis was based on Paulus Ægineta.

¹ M. Neuburger, *Hist. of Med.*, vol. i, p. 366; J. H. Baas, *Outlines of the Hist. of Med.*, p. 231.

Albucasis says: "I have detailed briefly the methods of operations; I have described all necessary instruments, and I present their forms by means of drawings; in short, I have omitted nothing of what can shed light to the profession . . . the apprenticeship of this branch is very long, and he who devotes himself (to surgery) must be versed in the science of anatomy, of which Galen has transmitted us the knowledge."

Thus it will be seen that this important surgical work by Albucasis was founded on the surgery and obstetrics of Paulus Ægineta, and the anatomy (which he obtained through Rhazes) on Galen.

His *Altaşrif* contains an almost verbatim account of smallpox as written by Rhazes.¹

Albucasis made no references to anatomical dissections, and this was probably due to Mahomet having expressly forbid the reproduction of the human figure; this also explains the crudeness or, shall we say, the lack of perspective in his illustrations of surgical appliances and instruments.

Albucasis' advocacy of the actual cautery led to the widespread use of this means of treatment throughout Western Europe during the Middle Ages. His surgical teaching, which was a distinct advance on the surgery of the travelling mountebanks, retarded the progress of surgery in the Latin West, as it produced a tendency to rely on the anatomical doctrines of Galen rather than on actual dissections. The blame for this cannot be laid entirely on Albucasis as the mental attitude of the scholastics of Latin Europe was one that leaned on the wisdom of the ancients, and thus it was that Albucasis' opinion of Galen's anatomy was so readily assimilated by the West. Albucasis' fame among the Arabs was soon surpassed by that of Avicenna, and he was not used to any great extent by the Arabian surgeons: it, however, was *the* standard textbook on

¹ J. Freind, *Hist. of Physick*, pt. ii, p. 125.

surgery in Europe for several centuries, being translated into Latin by Gerard of Cremona as early as the twelfth century.

The chief influence of Albucasis on the medical system of Europe was that his lucidity and method of presentation awakened a prepossession in favour of Arabic literature among the scholars of the West: the methods of Albucasis eclipsed those of Galen and maintained a dominant position in medical Europe for five hundred years, i.e. long after it had passed its usefulness. He, however, helped to raise the status of surgery in Christian Europe; in his book on fractures and luxations, he states that "this part of surgery has passed into the hands of vulgar and uncultivated minds, for which reason it has fallen into contempt". The surgery of Albucasis became firmly grafted on Europe after the time of Guy de Chauliac (d. 1368).

Albucasis' descriptions of operations are clear and particularly valuable because they portray the figures of surgical instruments used in the Middle Ages, for there are few illustrations dating during the Arabian Period: the most of the figures of mediaeval times were derived from those of Albucasis and incidentally show no knowledge of perspective.

These illustrations are, however, not the earliest found, for a few that are earlier than the Arabian Revival,¹ and represent an independent classical tradition, have been discovered in mediaeval manuscripts. There was, however, no *systematic* attempt to figure surgical instruments until the advent of Albucasis, though the illustrations in Arabic MSS. are not as well executed as in the Latin copies. Among the earlier MSS. may be enumerated Durham 100 (c. 1100) illustrating "branding" and Sloan 1975 (of the eleventh century but not later than the thirteenth) which is a pre-Arabian manuscript and has figures

¹ NOTE.—The Arabic MSS. of Dioscorides' *De materia medica libri V* (Leyden Bibl. acad. 1301; s. xv and Constantinople: Aya Sophia 3704; s. —) contain figures.

illustrating operations on the eye and nose, with diagrams of knives and a nasal speculum.

Important illustrated manuscripts of Albucasis are :

Huntingdon 156	} Bodleian.
Marsh 54	
Codex Arabicus 1980, Gotha.	

Marsh 54 is entitled in the Latin " Tractatus X libri Zaharavi dictus operatio manus " or " Chirurgia et ars medica, circa cauterizationem, et dissectionem et commissionem fracturarum, in tres partes distributus ". The Latin manuscript by Gerard of Cremona ¹ in the Bodleian describes what is the same work, as by Abulcasim, which is another name for Albucasis.

The following is a complete Latin manuscript of Albucasis, dating the early part of the thirteenth century :

Florence, Plutarch, 73, 25.

Another very early manuscript is Bamberg, Roman, 53, 15 ; yet another of the thirteenth century is Biblioth. Francaise, 13, 15.

There is a manuscript (containing extracts) at Montpellier (fourteenth century), and another at Leyden. There is also a Hebrew translation at the Bodleian Library.

The Latin translations of the *Altaşrif* were printed in Venice in 1497 (reprinted 1500, Locatellus), Strassburg, 1532 (Schott), and Basle, 1541 (Petrus), under the title *Albucasis methodus medendi, cum instrumentis ad omnes fere morbos depictis* ; the Basle edition is illustrated with woodcuts which are dissimilar to those in Channing's translation ; this edition also contains commentaries by Roland, Roger, Constantine, and Gasius. The Basle edition is also of interest, as it formed the basis of the work of John Channing, who published his *Albucasis de Chirurgia* in 1778 ; this edition is in Arabic and Latin, and there is a copy

¹ An illustrated MS. of Albucasis' *Chirurgia* translated by Gerard of Cremona is Paris. 10,236.

in the British Museum (52 h. 15, 16) and another in the Bodleian Library. Channing's edition is a rare work and difficult to obtain. The Basle edition also formed the basis of the work of Lucien Le Clerc, who published a French translation in Paris in 1881. A partial and very poor Latin rendering of this work is given in *Liber Theoricæ nec non Practicæ Alsaharavii* (Augsburg, 1519).

Albucasis wrote another medical work entitled in the Latin translation *Liber Servitoris*: book xxviii of this treatise was published in Venice in 1471 by Nicholas Jenson. It was translated into Latin by Simon Januensis and the Jew Abraham of Tortosa (thirteenth century?). A Latin version is in the British Museum. This compilation described the medical preparations obtained from minerals, plants, and animals, and represents an early example of chemistry applied to the practice of medicine. The arrangement of it is alphabetical.

The references to gynæcology in the *Altaşrif* were published by Caspar Wolph in his *Collectio gynæciorum*.

A Latin work entitled *Antidotarium*, by Johannes L. Tetrapharmacos, which is on materia medica, is ascribed to Albucasis. Another of his works introduced to the Latin scholars of the West was *Dictio de Cibariis infirmorum*, which was translated by Berengarius. The *De Simplicibus*, which has been ascribed to Albucasis, is probably by Abū-'l-'Salt.

The works of Albucasis are described in Carl Brockelmann's *Geschichte der arabischen Litteratur* (Weimar, 1898), vol. 1, pp. 239-40.

Abū Mervān 'Abdul-Malik ibn Zuhr or Ibn Zuhr [أَبْنُ زُهْر] (1113-62 or 1199) was known to Mediaeval Europe as AVENZOAR and ABHOMERON, and came of an illustrious Spanish family who embodied the clinical efficiency of the Western Caliphate. He was born at Seville and died in his native city in 1162.

Ibn Zuhr was taught medicine by his father (who held the

Canon of Avicenna in small esteem),¹ and achieved great fame as a physician in Spain and North Africa. One of the foremost thinkers of Islam, he was opposed to astrology and medical mysticism; the mysticism that he was opposed to may be said to have survived until recent times, and is exemplified in the dying declaration of a veterinary surgeon who when pressed for the secret of his success in surgery, said, "I biles my tools." Avenzoar, who took a great interest in *materia medica* and pharmacy, was opposed to logical distinctions and sophistical subtleties in the practice of medicine, regarding which he must have had the work of Alkindus in mind.²

His principal work is the *Altersir*, or *Theisir*: this is a treatise on practical medicine, and describes the methods of preparing medicines and diet in an interesting manner. In this work he lays down experience as the sole guide to the physician, and shows himself as a man of independent observation. He mentions the itch-mite³ (*acarus scabiei*), serous pericarditis, and mediastinal abscess, from the last of which he suffered personally and kept some very careful records of his own symptoms. He also described the operations for renal calculus and tracheotomy. His descriptions of these operations show that he practised surgery to some extent. From his writings it is seen that in his day the professions of the physician, surgeon, and apothecary were separated.

The *Theisir* is not known in its Arabic form, and was translated into Hebrew by Jacob in (?) 1280, and into Latin by Paravicinus⁴ a year later, and several editions of this Latin version were

¹ M. Neuburger, *Hist. of Med.*, p. 371.

² J. Freind, *History of Physick*, pt. ii, pp. 76-7, 101.

³ The *Theisir*, bk. ii, tract iii, cap. xix.

NOTE.—St. Hildegard of Bingen (1098-c. 1179), a contemporary of Ibn Zuhr, shares with him the honour of having first mentioned the itch-mite (cf. Withington's *Med. Hist.*, p. 241).

⁴ This Latin translation, which appeared in 1281, is said to be really by the Jew, Jacob (cf. Freind, pt. ii, p. 242).

issued before the close of the thirteenth century; it was later printed in Venice (1490) under the title *Abumeron Avenzohar*. This work was also translated into Latin by John of Capua¹ from a Hebrew version. A Latin edition (Venice, 1496) consisting of 108 pages, under the title *Abhumeron Abynzohar Colliget Averroys*, contains, as does the Venetian edition of 1497, the *Kitab-al-Kullyyat (Colliget)* of Averroës. Latin issues appeared in Venice in 1514, 1530, and 1553, and at Lyons in 1531. All these editions contain Averroës' *Colliget*.

Another work ascribed to Avenzoar, entitled in the Latin *Alquazir Albuleizer liber de curatione lapidis*, was published in Venice in 1497.

Ibn Zuhr's influence in medical Europe was far-reaching, and he exercised a great influence over the alchemists of Arabo-scholastic medicine in particular. He was the principal source of Arnold of Villanova (d. 1312), and the *Consilia* of Mediaeval times can be traced back through Sydenham, Lange, and Arnold to the clinical methods of Ibn Zuhr. Further, his opinion of the *Canon* of Avicenna was not without its influence on the Arabo-scholastic alchemists, while his admiration of Galen's exposure of mysticism and charlatanism tended to confirm Galen as 'the medical Pope' in the West of Europe, though Ibn Zuhr did not accept Galenism *in toto*, he having contradicted some of the latter's dictates, a perilous undertaking for an Arab at that time. He died at an early age, honoured as "The Wise and Illustrious".

Ibn-Ruschd [ابن رشد], or more fully, ABŪL WALID MUHAMMAD IBN-AHMED IBN-MUHAMMAD IBN-RUSCHD, was known in Latin Europe as AVERROËS. Born at Cordova in 1126, he studied philosophy, law, and medicine, and (according to Leo

¹ John of Capua was a converted Jew who was instrumental in communicating an enthusiasm for Oriental literature in the Latin West by his *Directorium humanæ vitæ* (1270) and a Latin translation of *Kalilah and Dimnah*, also from the Hebrew.

Africanus) was a friend of Avenzoar, the great Arabic clinician. He was the truest follower of Aristotle among the Arabians, and his free thought aroused doubts as to the creed of Islam and the Church, with the result that he was hated by both.¹

Averroës found the favour of Abubacer (the vizier Ibn-Tufail) and, having a knowledge of the Malekite system of law, was made cadi of Seville in 1169, and during the next twenty-five years he served in similar positions in Cordova and Morocco.

Averroës' prime found him in contact with both the political decadence of Islam in Spain and the orthodox reaction, which burst into flame in c. 1195, in which year he was removed from office and recalled to Morocco where he died on the 12th December, 1198,² spending the last few years of his life in prison.

The year after his death, his patron Yūsuf al-Manṣūr lost the political control of Spain, and with this event we come to the end of the culture of the liberal sciences among the Arabs and there was a reversion to the meagre medicine of the Moslem fanatics, who rested content with the natural science of the *Qur'ān*. The rapid decline of Arabian Medicine and Learning generally is closely connected with the Mongol invasion of Eastern Islam.

Living as he did at the time of intellectual retrogression, religious bigotry, moral decay, and feeble political power in Islam, Averroës' fame among the Moslems passed away with his death by the end of the twelfth century. But his system of Aristotle, which was adopted by the Spanish Jews and through them carried over to Christian Europe, led to Averroës looming in the West as one of the most influential of the Arabians.

Averroës knew no Greek, and as he attempted to found a system of medicine on the philosophy of Aristotle, he probably used the Arabic translations of this writer that were extant in

¹ E. Renan, *Averroës et l'Averroïsme* (2nd ed., Paris, 1861).

² L. Choulant, *Bücherkunde*, p. 377; there appears to be some doubt as to the date of his death, for the dates vary between 1198 and 1225.

Islam. He declared that his principal ambition was to obtain the title of "commentator on the writings of Aristotle"; he combined religious belief with Aristotelianism and Neo-Platonism, and these doctrines exercised an important influence over the views of Latin Europe up to the seventeenth century. His perception of God and Nature shook the foundations of both Christianity and Islam and, as was to be expected, found bitter opposition from both the latter.¹

Averroës explained everything by series of emanations, the last of which is the Divine Intellect, the active intelligence which enters into contact with man's passive intelligence (the Soul), and he held that thought is the result of the union of these two principles. His pantheistic doctrine that the soul or nature of man is absorbed into universal nature at death and that 'personal immortality' was not a creed that could be accepted, led to Averroës and his school (which included Maimonides) being persecuted by both Moslem and Christian. A legendary tale has it that when the Christians and Moslems relegated his books to temporal and his soul to spiritual flames, Averroës uttered the Arabic equivalent to the brilliant answer "Sit anima mea cum philosophis" (Garrison).

Averroës from the West and Avicenna from the East were the two principal leaders of abstract thought in the Middle Ages of the West. Averroës, however, stood far below Avicenna in the esteem of the Christian scholastics; none of them could have really understood Averroës, or Avicenna for that matter, because of the Latin translations in mediæval times being both barbarous and obscure.

'Averroism' made a deep impression on the mediæval mind of Europe owing to the infectious enthusiasm with which the Jews of Spain took up the Averroistic interpretation of Aristotle, and when they were driven from Spain they spread

¹ T. Puschmann, *Hist. of Medical Education*, trans. by Hare (London, 1891, p. 180).

Averroës' doctrines in the South of France and in Italy. The fourteenth century saw the golden age of Jewish Averroism, during which many commentaries on Averroës appeared; the first of these were by Levi ben Gerson. In the fifteenth century Averroism among the Jews began to decay, and in the following century we see its final disappearance; the later Jews, e.g. Spinoza, were not in touch with the Averroistic tradition, which, however, survived in Italy. I shall have more to say on this subject later.

The importance of the Jews in relation to Western scholasticism may be said to date from the reign of the Cordovan Caliph Abd-ar-Rahman, when Jewish scholarship was transferred from the East to Cordova. Of the most eminent of the Spanish Jews, Avencebrol, otherwise known as Ibn Gabirol, or Jabirul, is said to have introduced Neo-Platonism to the West, while Avempace (d. 1138), who was also known as Ibn Bāyya, wrote *The Hermit's Guide*, in which he continued the work of al-Fārābī (c. 1100), and not Avicenna. Avempace, who developed the Neo-Platonic interpretation of Aristotle, was used by Averroës and, in turn, the Neo-Platonic material that was developed in the Latin West was an adaptation of the teaching of Averroës. Averroës had no influence on the Arabians.

In regard to practical medicine, Averroës rejected the employment of mathematical formulæ in the prescribing of medicaments such as practised by Alkindus; he was also opposed to Galenism.

Averroës' main work was embodied in his *Kitab-al-Kullyyat*, transliterated in the Latin West as *Colliget*; this work, which is a *résumé* of medical science, is divided into seven parts, and was translated into Latin by the Jew Bonacosa at Padua in 1255, and a Latin translation was published at Venice in 1482 and contains only the works of Averroës. The Latin edition (Strassburg, Argentorati, 1531) contains, in addition, the work of Rhazes, Serapion Junior, and Avenzoar. Averroës wrote

a commentary on Avicenna's poem *Canticum de Medicina* (translated into Latin by Armengaud), and also mentioned the *Philosophia Orientalis* of the latter. His commentary of the *Canticum* was published at Venice in 1484 under the title *Incipit translatio Canticor. Avic. cum commento Averrhoys facta ab Arabico in Latinum a mag. Armegando blassi de Montepesulano*. His other works include the following which were translated into Latin by Michael Scot : *De generatione et corruptione* ; *De anima* ; *De sensu et sensato* ; *De substantia orbis* ; and *De metaphysica*. While William de Lunis translated *De introductio Porphyrii*, Andreas Alpagus translated *Tract. de Theriaca*, Alfonso of Toledo translated *Tract. de Separatione primi principii*, Kalonymos C. Kalon translated *Destructio destructionis*, and Herman the German translated his commentaries on the *Rhetoric* and *Poetics* of Aristotle. Besides these may be mentioned his *De concordia inter Arist. et Galenum*, *Tractatus de Animæ Beatitudine*, *Tractatus de Separatione Naturali*, and *De venenis* (otherwise known as *Omnes species mortiferorum partiuntur*—this work was known to Arnold of Villanova).

Averroës' commentaries were translated into Hebrew by Moses ben Tibbon (c. 1260), who was one of the great family of Jewish translators of the Middle Ages.

Musa ibn Maymun [موسى بن ميمون], known in Latin Europe as MAIMONIDES, RAMBAM, or RABBI MOSES BEN MAIMON (1135–1208), came of a prominent Hebrew family. His early years were not a little influenced by the fact that the victorious Almohades occupied Cordova (1148), and that Cordova as a seat of learning had begun to decline. The religious orthodoxy and primitive simplicity of the Almohades, who came from North Africa, made the position of the Spanish Jews intolerable, and Maimonides, after many vicissitudes, escaped from tormentors and settled at Fez (1160–5); here he made the acquaintance of the Moslem, 'Abdu'l-Arab ibn-Muisha, who assisted him in making a definite commencement with literary work.

Maimonides, being alarmed at the results of his own doctrines against 'absorption', fled to Palestine and then migrated to Egypt. While in Cairo, he lost his entire fortune and turned to medicine for a living. His professional career was a most prosperous one, as he enjoyed great fame and became body physician to Saladin. He is said to have refused a similar appointment to Richard I of England. In order to orient our facts I would draw attention to the general history of the times. Saladin (Arab. Salah-ud-din), in whose person were realized the highest ideals and virtues of Mahomedanism, was the first Ayyubite Sultan of Egypt (1170-93) at a time when the Baghdadi caliphs held but a nominal power which in reality was wielded by their viziers. Richard of England arrived at Acre in 1191, and it was during his stay in Palestine that the reputation of Maimonides prompted Richard the Lion Heart to try to secure the former's services.

Maimonides, who very materially helped to establish an Averroistic school in the West of Europe, was a contemporary of Averroës. There appears to be some doubt as to whether he came under Averroistic influence while at Cordova or whether, as is sometimes asserted, he heard of Averroës only after he went to the court of Saladin at Cairo.

Maimonides, who is regarded more as a theorist than as a practical physician, did not receive as much appreciation at the hands of his contemporaries as he did by later generations of Jews.

His medical works alone concern us; these are written in the semi-philosophic style of Avicenna and Averroës. His *Book of Counsel* (*Tractatus de regimine sanitatis*) is a work on diet and personal hygiene, and was issued in the form of letters to the Sultan Malek al-Afdhal ibn Saladin: it consists of four tractates. The first is on general rules for the maintaining health, the second is on first aid where medical assistance is not available, the third is on personal advice to Saladin, and

the fourth is on matters useful to "sick and well in all times and places". In the third book he prescribes syrup of raisins and vinegar, which are "much used by Avenzoar". This book was written in Arabic and translated into Hebrew by Rabbi Moses Ben Samuel Ben Tibbon, and was printed in Hebrew at Prague in 1838. Several Latin versions were subsequently issued, e.g. the Florentine (before 1484) and the Augsburg (1518) editions.

Maimonides translated the *Canon* of Avicenna into Hebrew, and made a collection of the aphorisms of Hippocrates and Galen, *Aphorismen Mosis*. The latter was written in Arabic between the years 1187 and 1190 and contained extracts from the sixteen books of Galen on the pulse; this work was translated into Hebrew by Rabbi Nathan Amathi (MS. Bodl. Uri 412), and a Latin translation¹ was published at Bologna in 1489 under the title of *Breviarium*: this edition contains the Aphorisms of Janus Damascenus. Another Latin edition was published at Basle in 1579 (Petrus).

Arabic originals of Maimonides' Aphorisms are to be found at Constantinople, the Escorial, Gotha, Göttingen, and Leyden.

Maimonides' treatise on poisons (1198), which was dedicated to the Cadi El-Fadhil, was widely read in Mediaeval Europe, and was frequently referred to by the physicians of the West. It was on the poisons of reptiles and their antidotes. This work was translated from the Arabic into Latin by Armengaud. A French translation by J. M. Rabbino-witz was published at Paris in 1865. The Arabic originals of the tract on poisons are at the Bodleian (Uri 570,608), the Escorial (Cas. 884), Florence (253), Paris (1094), and Gotha (1986).

In his work on hæmorrhoids (MS. Bodl. Mich. 51), Maimonides cites Rhazes, Avicenna, and Ibn Wafid (Aben-Guefit).²

¹ A Latin MS. is *Fürstenb. Bibl.* 798; s. xviii, f. 1 (Aphorismi Rabbi Moysis ex Gal. collecti).

² M. Steinschneider, *Die hebräischen Übersetzungen*, p. 763.

His other medical works include a tract on asthma, *Tractatus contra Passionem Asthmatis* (MS. Madrid, 601).

The following works of Maimonides, though not on medicine, are of medical interest, *Leges et ritus jejunandi Hebræcor* (Leipzig, 1662), and *De cibis vetitis* (Leipzig, 1734).

The works known in Latin translation as *Aphorismi* and *De causis accidentium* are ascribed to Maimonides.

Maimonides boldly rejected much Rabbinical tradition, endeavoured to reconcile the claims of faith and reason, and taught a Jewish modification of the doctrines of al-Fārābī and Avicenna: his MSS. are rarely found without Averroës' commentary, while his advanced thought, like that of Averroës, aroused much hostility; it was not until long after his death (1204) that he was recognized as a great Jewish teacher. His *Guide to the Perplexed*, which was an independent criticism of Aristotle's principles, was issued in 1190; it was written in Arabic under the title *Dalalat al-Ha'irin* and translated into Hebrew as the *Moreh Nebukin* by Samuel ben Tibbon in c. 1204. Latin translations were used in the Western Universities during the High Scholastic Period, when they occupied a position of influence. An Arabic text edited by Munk was published in Paris in 1856-66, and an English translation was issued by M. Freidlander in 1881-5.¹ There is a careful account of the medical works of Maimonides in Vol. I of Singer's *Studies in the History and Methods of Science* (1917) by R. Levy, while Steinschneider's *Die hebräischen Übersetzungen des Mittelalters*,² one of the most scholarly works of last century, contains much valuable material. A new catalogue of Hebrew printed books based on that of Steinschneider (Berlin, 1852-60) is being prepared by the Librarian of the Bodleian Library and L. B. Frewer, and it is expected that Hebrew books that never got into Steinschneider's catalogue will be incorporated, and the whole ready

¹ Reprinted in 1 vol., London (Routledge), 1904.

² Berlin, 1893, § 481.

for printing by the end of the summer of 1923 (see the "Annual Report of the Curators of the Bodleian Library for 1922", *Oxford Univ. Gazette*, vol. liii, 14th February, 1923, pp. 344-54).

We will now consider the writers of the Western Caliphate other than those mentioned in the opening paragraphs of this chapter. The placing of some of these presents a difficulty, as it is not possible to put them definitely in either Eastern or Western groups, and beyond the fact that they are Arabian writers there is no authentic data to assist one in placing them. Of these was the writer **Ibn Serabi** [ابن سرابی], more commonly known as SERAPION JUNIOR. He lived not earlier than the eleventh century (c. 1070). Many works on 'Simples' were written under the name of Serapion. The work *Selecta artis medicæ* has been ascribed to the Serapions, but the material available does not justify us in coming to a definite conclusion on the matter. Serapion Junior, however, wrote a work based on Dioscorides and Galen and entitled *Liber de medicamentis simplicibus* or *De temperamentis simplicium*, in which he mentions a similar work by Aben-Guefit. Serapion Junior was perhaps translated into Latin from Hebrew (Singer). There are no Arabic MSS. of this work extant. The work was translated into Latin by Simon de Cordo of Genoa, and also by the Jew, Abraham of Tortosa. The Latin translation of Abraham was published by Anthony of Parma (Mediolani, 1473), under the title *Liber Serapionis aggregatus in medicinis simplicibus, translatus. Simonis Januensis interprete, Abraham Judæo Tortuosiensi de arabico in latinum*. Other Latin publications include the Venetian of 1479 and 1552; the latter was issued under the following title: *Serap. de simplic. medicam. historia libri VII Nicol. Mutono interprete*. The Latin version published at Strassburg in 1531 was based on the translation of Abraham and was issued together with the work of Averroës, Rhazes, and Galen (*De centaurea*). This work on Simples has also been ascribed to Albucasis.

Aben-Gueft (997-1075), of the Latin West, was IBNU'L-WĀFID [ابن الوافد] or EBN WAFEDAL LACHMI of the Arabians. He was a Spaniard of Toledo who wrote a work on Simple Remedies *Liber de medicamentis simplicibus* or *Liber virtutibus medicinarum et ciborum*. This work is based on Dioscorides and Galen, and also on the pharmaceutical doctrines of Alkindus. Serapion Junior refers to his work.

It was not printed in Arabic. A Latin translation by Gerard of Cremona was later printed and issued as supplements to the *Opp. Mesués*, and also published together with the *Tacuin sanitatis* and *Alkindus* in Strassburg, 1531 (Argentor.).

Ibnu 'l-Bayṭār [ابن البيطار], otherwise EBN ALBE'THAR, or more fully ABU MUHAMMAD ABDALLAH IBN-ĀHMAD IBNU 'L-BAYṬĀR, was a Spaniard, and was born at Benana near Malaga, and died at Damascus in A.D. 1248. He is said to have met Ibn Abi 'Uṣaybi'a in Damascus in 1235. His principal work was written after having travelled and studied medicinal plants in Greece, Egypt, and Asia Minor, and was based on the philosophy of Aristotle and the materia medica of Dioscorides. It was entitled, in the Latin translation, *Liber magnæ collectionis simplicia medicamentorum et ciborum continens*, which was undoubtedly the fullest work on materia medica in Arabian Medicine. This work contains descriptions of about 1,400 medicaments, of which 300 are said to have been new at that time; it also gives a complete summary of the remedies used among the Arabians, and numerous Syrian and Egyptian drugs, thus constituting a compendium of materia medica and dietetics.

The best MSS. of this work are in Oxford, and there are two at Hamburg. The translation of Galland is lost. An Arabic manuscript is at Leyden *Bibl. acad.* 805³; s. (*Ibn Beitar medica-menta simplicia ord. alphab. Ex. Gal. et Dioscor.*).

A Latin work *Ebn Bitar de malis limonis*, compiled by Andrew Alpagus, was published in Venice (1593), Paris (1602), and

Cremona (1758). A German translation of his writings was published at Stuttgart in 1840.

With Ebn Albe'thar we come to the last of the medical writers of the Western Caliphate whose literary efforts were of any consequence or survival-value to Arabian Medicine or to the medical system of thought in Europe during the Middle Ages.

had no foundation for the statement, was doubtless due to the fact that Harūnu'r-Rashīd sent an ambassador to the Court of the Emperor of the Holy Roman Empire of the West. The vague Arabian rumours that were current in Western Europe towards the latter part of the Dark Ages, were probably associated with the exchange of courtesies between the emperors of the Arabic East and the Latin West.

The invasion of the Roman Empire of the West by swarms of barbarians from the forests of Northern Europe had rendered its magnificent territory desolate, and reduced its inhabitants to slavery. Each succeeding generation saw new invaders, all of whom left tracks of destruction behind them.¹

¹ T. W. Rolleston in his *Myths and Legends of the Celtic Race* (London : Harrap, 1917), p. 92, writes as follows : " Let it be remembered that in the early Middle Ages, Celts from Ireland were the most notable explorers, the most notable pioneers of religion, science, and speculative thought in Europe. . . . For instance, Pelagius in the fifth century ; Columbia Columbanus and St. Gall in the sixth, Fridolin, named *Viator* ' the traveller ', and Fursa in the seventh ; Virgilius (Feargal) of Salzburg, who had to answer at Rome for teaching the sphericity of the earth, in the eighth ; Dicuil, ' the Geographer,' and Johannes Scotus Erigena—the master mind of this period."

Romilly Allen in his *Celtic Art* (p. 13) says : " The great difficulty in understanding the evolution of Celtic art lies in the fact that although the Celts never seem to have invented any new ideas, they professed an extraordinary aptitude for picking up ideas from the different peoples with whom war or commerce brought them into contact. And once the Celt had borrowed an idea from his neighbours, he was able to give it such a strong Celtic tinge that it soon became something so different from what it was originally as to be almost unrecognizable." The Celts, however, were not such utter *barbarians*, for we find that enamelling was unknown to the classical nations until they learned the art from the Celts and Anglo-Saxons. As late as the third century, Philostratus writes, " They say that the barbarians who live in the ocean (Britons) pour these colours upon heated brass, and that they adhere, become hard as stone and preserve the designs that are made upon them." Though this is a matter outside the scope and purpose of this book, I would merely mention for the more curious, that the bronze and enamelled shields and helmets, stamped tiles and interlaced ornamentation in the illuminated MSS. (Case 1, " The English School ") in the British Museum, show that contrary to the usual statements, pre-Roman Britain was a comparatively civilized country in regard to literature and ' military equipment'; and though overrun by the Roman armies see Cæsar's *Gallic Wars*, book 3, ch. 14, 15, and Tacitus), Britain made great

The welter of race intermixture that followed led to the languages of the people not having the well-defined distinctions that later developed, and the language of the Western European of the Dark Age may be defined as *currente calamo*, while among the more educated, who were for all practical purposes limited to the clergy, Latin was cultivated, and thus it was that the Church became the foster-parent of any culture that survived the hand of the northern barbarian.

The feudal system that prevailed gave the first suggestion of nationhood to Europe, and this was further developed by the banding together of groups of people in order to resist the depredations of their feudal lords.

Both the Church and the manorial lords collaborated in the preservation of the relics of ancient learning, and through the medium of the clergy, medical literature was 'collected',¹ though during the latter part of the Dark Age and early in the Middle Ages, the actual practice of medicine was divided between the medical monks and Jews, while the pretenders to a knowledge of the science of medicine were legion. It is said that towards the close of King Alfred's reign (d. 901) some countrymen of Johannes Scotus (Erigena) produced Gaelic versions of Hippocrates and Galen; this statement is of much interest, and an investigation of the Gaelic MSS. extant would possibly yield interesting results.

contributions to any culture that survived in the Dark Age, when the following names are prominent in the world of science and advancement, Pelagius, Columbia Columbanus, St. Gall, Fridolin, Dicuil, Johannes Scotus (Erigena), and Alcuin the centre of the Anglo-Saxon Period of the Carolingian Renaissance, and then we have the great Anglo-Norman Scholastics of the Middle Ages, followed by the great Englishmen of Modern Times, e.g. Harvey and Lister, and finally the yet to be acknowledged gigantic effort of the men of our generation in the Great War (1914-8) when the bulk of the real work in defence of the accumulated heritage of all times was preserved from the hand of the modern barbarians.

¹ Lammert, *Volksmedizin u. medicin. Aberglaube in Bayern* (Wurzburg, 1868), p. 4; J. B. L. Chomel, *Essai historique sur la médecine en France* (Paris, 1762) (cited by T. Puschmann in his *Hist. of Med. Educ.*, p. 193).

It is fortunate that the Greek MSS. were conserved in the Roman Empire of the East (Byzantium) during Europe's Dark Age, when the promised harvest from the work of Cassiodorus and Alcuin were but dim lights in the intellectual twilight.

During the Dark Age, quackery was dominant, and charms, amulets, and relics, combined with injunctions to bear pain, were the principal forms of medical treatment. The cataclysm of the fall of the Western Empire had a paralysing effect on the mental qualities of the West. Early in the Dark Age the Roman (pagan) schools had all but disappeared, and these were later replaced by the cathedral and monastic schools, the principal aim of which was the education of the priest and the monk. These Christian schools, however, though in complete contrast to the pagan schools, whose places they had taken, were naturally compelled to rely on the only textbooks available at that time in the West; these included certain philosophical writings of Aristotle, Porphyry, Martianus Capella, and Boethius, and it was these pagan works that kept Europe from sinking to even lower intellectual depths than was actually the case.

The work of Cassiodorus in the sixth century was to all intents and purposes lost to the Dark Age, for as far as written records show the educated in the Latin West did not go far beyond collecting Ancient Medical MSS. With the eighth century we see the first dawn of civilization in the West, the chief impulse to which was the early contact between the Latin West and Islam, and, says Baas,¹ "the work of the English."

The steady outpour of leaders and scientists from the British Isles,² even from the earliest times, contributed in a large measure

¹ J. H. Baas, *Outlines of the Hist. of Med.*, p. 196.

² Anglo-Saxon Literature begins with Alfred the Great (871-901). Before the time of Alfred the Insular Celts of Britain maintained a certain standard of intellectual culture which compared very favourably with that prevailing on the Continent of Europe. We have the evidence of the Venerable Bede (674-735) that the English monks who founded centres of learning on the Continent (Tours and Chartres) did not neglect Medicine. Bede left a treatise on venesection.

to the preservation of civilization during the Dark Age. The downfall of the Roman Empire of the West, which was due to race intermixture combined with luxury, dissipation, and malaria, finally led to the relaxation of morals, and that deference to mysticism and the authority of the supernatural that paved the way for the bigotry, dogmatism, and mental inertia of the Middle Ages.

The advent of Charlemagne or Charles the Great (742-814), the founder of the Holy Roman Empire (800-1806), led to the union of the various races under one domination, and the Western Empire seemed to have resuscitated. Charles drove Islam behind the Ebro, and his rule extended from Italy in the South to the border of Denmark in the North, and from Germany in the North-East to the Pyrenees in the South-West. The expansion and consolidation of Latin Europe under this Frankish ruler with the growth of Christianity under his protection (he was the protector of the Pope) led to the tranquillity that was necessary for the cultivation of education and science. In the cathedral and monastic schools medicine was taught in a limited way under the name of *physics*, and it was this that led to the practice of medicine and the other liberal professions passing under the domination of the Church. The physician was termed "physicus" and the court-physicians were recruited chiefly from the ranks of the clergy.

The attitude of the Christian writers and teachers from the time of the fall of the Western Empire to the tenth century did not tend to the development and advancement of the science of medicine, and the theory of the macrocosm and microcosm formed the central dogma of the science of the Dark Age. There was a servile obedience to the authority of the ancients, with its attendant evils of pedantry, bigotry, and cruelty, all of which were supported by a reliance on charms, amulets, and relics.

From the death of Charlemagne to the rise of the School of

Salerno, Latin Europe sunk to its lowest depths of degradation, though if we judge from the literature of the Scots, Europe was not comparable to the mythical Caliban who hovered on the lowest limits of civilization.

The death of Charlemagne in A.D. 814 was followed by a period of constant warfare between his former vassals, and the insecurity resulting therefrom contributed powerfully to the degradation of science, which sought asylum in the monasteries.

The disturbed conditions that prevailed tended to the suppression of experimental science, and even of the actual verification of premises, and the mediaeval thinkers appear to have been under a ban. Christian Europe thus slowly sank into a state of increasing ineptitude (Singer), while on the other hand Moslem Spain and Sicily which had absorbed the relics of Greek Culture, produced a wealth of original literature which reached its zenith from the ninth to the end of the twelfth century.

The tenth and following centuries, associated as the times were with religious disturbances, connected with the premier position occupied by Islam and also the idea of the indefinite extendability of knowledge, find us in contact with new intellectual forces from the East (Singer). Up to the time of the Crusades (1096-1272) all Europe, with the exception of Italy, was in a state of comparative barbarism.

Towards the close of the eleventh century the preaching of Peter the Hermit was followed by a spirit of religious enthusiasm, and Europe was rapidly converted into an armed camp from which the crusading barons collected the more fanatical elements, large numbers of whom embarked for the Holy Land from the port of Salerno and returned by the same route. These events resulted in Salerno becoming a variety of 'base hospital' for the military Christians. Among the other results of the Crusades that are of medical importance were that Latin Europe was freed from its more turbulent elements, and the student element was able to breathe more freely ; previous

to the Crusades, learning had received only a limited protection within the pale of the Church. Europe was also freely inoculated with the virus of leprosy, the full results of which were seen in the lazar houses of the pre-Renaissance Period. Syphilis is also said to have been introduced in a virulent form from the East.

The sick and wounded from the Holy Land during the Crusades brought with them a taste for poetry and works of imagination which expressed itself in medical writings.

The Crusaders were undoubtedly influenced by the medical and philosophical doctrines of the Arabians, and some of the Eastern views on astrology were carried to the Latin West in this way and incorporated by the Latin writers in their works : an excellent example of this method of extending Arabian culture are the works of Herman the Cripple of whom I shall have more to say directly. The Arabian rumours that drifted over portions of Western Europe were in no small measure the direct result of the information brought home by the returning barons and their followers. Le Clerc rightly points out that the contact of the Arabs with Southern Italy *and the Crusades* contributed to the spread of Arabian Medicine, and culture generally in the West of Europe ; while Freind adds that the spread of Arabic thought in the Latin West was in a great measure due to the Western Caliphate.¹ Precisely how Latin Europe came to be under the domination of Arabian methods of thought will be discussed in the following pages, and the MSS. and Books will be named in detail (as far as our research has permitted us).

The Norman duke, Robert, took possession of Salerno in 1076, and from this time up to the foundation of the University of Naples in 1224, Salerno was the principal university of Christendom. The Jew, Benjamin of Tuleda in Spain, who is said to have visited this seat of learning in 1164, alluded to it as the

¹ Freind, *Hist. of Physick* .pt. ii, p. 218.

principal university of Christendom ; while Ordericus Vitalis (early twelfth century) described Salerno as being ' long famous '.

The Christian West, however, was ripe for the germination and vigorous growth of Arabic Culture, which appeared as a constellation in the South of Spain. The rays of intellectual light came to Europe at an opportune moment in its declension and, despite the prevailing bigotry in Christendom, the culture of the Cordovan Caliphate gradually overcame many objections and obstructions and its intellectual heritage became that of Europe generally.

In this work we are concerned chiefly with the influence of the Arabs on the Medicine of the Middle Ages, but it must not be lost sight of that Europe owes a great deal to Arabian philosophy, music, and the idea of separating science from theology. An interesting work by De Lacy O'Leary of Bristol, entitled *Arabic Thought and its Place in History* (Trubner's Oriental Series, 1922), deals with Arabian Philosophy, while an aspect of Moorish Music is at present under research. In this volume we will adhere, as strictly as the facts permit, to the history of the development of Arabist ideas and interpretations, on the medical system of thought in the Middle Ages.

Mediaeval Medicine may be considered a broad stream which received affluents from every side, and the Age of Early Arabian Rumours represents the first evidence of the overwhelming tide of Arabic medical literature which later became one of the strongest and deepest currents in this stream of ordered thought.

The flow of Arabist ideas was at first in the nature of vague rumours, due to the Arabian dominancy as an Empire and to the reputation enjoyed by the Arabian physicians, combined with the peripatetic tendencies of some of the subject races of the Arabians, particularly in the direction of the Latin West, where their superior learning and 'travelled intelligence' found a market ; from the MSS. extant, it is seen that the Jews

were the earliest to convey Eastern influences to the West, as will be shown presently.

It is customary to represent the Dark Age as perhaps too dark, owing to what Baas terms "classic regrets".¹ Cassiodorus (c. 490–585), the historian, statesman, and monk, in order to preserve human knowledge from the destruction that threatened it at the hands of the Northern barbarians, founded two monasteries, where he collected Greek MSS., and had these translated into Latin for transmission to posterity.² In his *Institutiones divinarum et humanarum literarum*, lect. i, C. 31, he says: "read Hippocrates and Galen in Latin translation." This historical fact, combined with the circumstances under which scientific studies suffered during the Dark Age, and the fact as stated by Lammert and Chomel that medical literature was 'collected' by the clergy, and also that Alcuin³ (735–804),

¹ Baas, *Outlines of the Hist. of Medicine*, p. 196.

² The example set by Cassiodorus was assiduously followed by the monks, and with the foundation of the Order of St Benedict at Montecassino in A.D. 529 (i.e. the same year in which the Emperor Justinian closed the School of Philosophy at Athens), many MSS. were said to have been collected in the cloister, and many extracts from the writings of Hippocrates, Galen, Rufus, Oribasius, Alexander of Tralles, and Dioscorides, were translated into Latin between the fifth and eighth centuries. The greater number of these translations are now lost.

³ Alcuin of Eboracum (York), who served at the Court of Charlemagne, took a prominent share in the Anglo-Saxon period (781–90) of the Carolingian Renaissance, and his researches in Italy in the latter part of the eighth century brought him into contact with Hippocratic writings, which may have been the relics of those collected originally by Cassiodorus, though with our present knowledge it is not possible to raise the point from the obscurity in which it is enshrouded. However, he writes:—

"Accurrent medici mox Hippocratica secta ;
Hic venas fundit, herbas hic miscet in olla ;
Ille coquit pultes, alter sed pocula præfert ;
Et tamen, O medici, cunctis impeditæ gratis
Ut manibus vestris adsit benedicto Christi."

NOTE.—Alcuin, who was entrusted by Charlemagne with the revival of learning in the Latin West, lived during the time when the Caliph Hārūnū'r-Rashid ruled Islam, and Charlemagne, who no doubt was prompted by the

who was the most prominent figure in the Anglo-Saxon or Central Period of the Carolingian Renaissance, mentions Hippocrates, and is said to have travelled in Italy in order to collect MSS., and that during the last decade of the tenth century (A.D. 991) the *Aphorisms* of Hippocrates were taught at Chartres, i.e. long before the time of Constantine the African (d. 1087), would suggest that shreds of Hippocratic Medicine survived in the Latin West during the Dark Age owing to Anglo-Saxon influences. Hippocratic Medicine, which promised to rise phoenix-wise from its ashes during the reign of Charlemagne, befell a period of neglect after the death of this monarch, and did not recover itself until the Græco-Arabian writers of Islam had made their influence felt in the scholastic circles of the West. The fact that Hippocrates' *Aphorisms* were taught at Chartres in A.D. 991 and its import, from the point of view of Arabian influence in the West, will be discussed later.

The latter part of the Dark Age saw the development of European civilization, in which medicine was a vanguard. The fact that the Dark and Middle Ages were marked by a series of wars and epidemics,¹ would explain the prominence given to the healing art. The *Nibelunglied*, the Anglo-Saxon leech-books and Norse sagas, show that medicine had sunk to a very low level, and that the medical care of the sick and wounded was in the hands of men and women who ranked with menials.

The foundation of a hospital at Minda by Bishop Masona (c. 580) and the fourth book of Bishop Isidore of Seville's encyclopædia indicate that the lamp of medical culture was not entirely extinguished during the Dark Age, though the Draconic Code eventually succeeded in suppressing the medical profession

competitive spirit of the times, tempted Alcuin from his native England to the Continent with the gift of two manors in Frankland; thus this early renaissance at the head of which were the English, must be looked upon as the echo of the Arabian Renaissance in the East.

¹ Baas, *Outlines*, p. 238.

among the Visigoths, until the arrival of the conquering armies of Islam.

The Arab conquest of Sicily in the seventh century and the Moslem ¹ domination of the island until it was overrun by the Normans in the eleventh, would explain the Arabist tradition of this part of Europe, and also the vague Arabian rumours that reached even as far north as Switzerland ; it is through this route that Salerno and the Latin West is said to have received the early Latin translations referred to in the legend associated with the time of the Baghdadi Caliph al-Ma'mūn. According to this tradition, Latin versions of the Greek works obtained from Byzantium were prepared for the teachers of the West, and among these the Hippocratic and Galenic works were sent to the newly acquired territories of the West ; none of these early Latin MSS., however, are extant, and it is doubtful that they ever existed ; I shall have more to say on this matter in the next chapter.

The close contact between the Latins and Arabians in Spain in the seventh century onwards, would account for some of the rumours that penetrated into the heart of the European West [see Map I].

Up to the time of the Crusades (1096-1272) all Europe, with the exception of Italy, was in a state of comparative barbarism ; a few shreds of Greek Medicine may have drifted over from Byzantium, but evidence of direct contact between Latin Europe and the Byzantine East is lacking. Early in the Dark Age Byzantine Medicine was not unknown in the West ; the Byzantine Anthimus ² was physician to Theodoric the Great (fifth century), while the archiactors Peter and Reovalis, who lived in the latter part of the fifth and early sixth century, received at least part of their education at Byzantium.

¹ A. F. v. Schack, *Poesie und Kunst der Araber in Spanien und Sizilien* (Berlin, 1865), ii, 1-252.

² Baas, *Outlines*.

With the gradual degradation of science from the downfall of the Western Empire, the material loss was accompanied by intellectual decadence, and the principal writings that were produced by the end of the Dark Age (ninth and tenth centuries) were the *Leech Book* of Bald, the *Lacnunga*,¹ and translations of Sextus Placitus.

Towards the latter part of the Dark Age, a large number of religious societies sprang up, including orders of medical women ; the most of these were suppressed owing to irregularities in their conduct. Even in the Salernitan period, which will be discussed later, the Church passed a number of edicts (1130–1247) which were aimed at the practice of medicine by the clergy, but the unfortunate result was that the medical profession as a whole came under their odium, and medicine in its legitimate sense, which had hitherto found a haven in the Church, had to seek asylum elsewhere, while the practice of the healing art in a large measure fell to the quack and the itinerant mountebank. The educational equipment of the medical fraternity usually consisted of a knowledge of a few symptoms, and the possession of a few formulæ : books were scarce and costly, and capable teachers were not easily available : the practice of medicine was under no systematic control ; so that any who cared to practise as physicians or surgeons could do so without hindrance : this led to the rise of a large number of uneducated practitioners, such as barbers, keepers of baths, and women of no particular training.

Although there was no recognized portal to the profession of medicine, there were certain restrictions and penalties attached to actual practice (The Draconic Code).

The doctrine of the four elements,² the origin of which is

¹ A book of Anglo-Celtic magic.

² The origin of the doctrine of the four elements is lost in the mists of antiquity ; in Egypt it was associated with Osiris and Isis : in India with Maha Devi and Sita, in Druidical Britain with Hu and Ceridwen, in Scandinavia with Odin and Frea, and in Mexico with Tlaloc and the Great Mother. In those

lost in the mists of antiquity, was accepted in the Latin West before its impregnation with Arabian modes of thought ; this and other beliefs were gradually reintroduced with renewed vigour by the Arabists, and will be discussed in subsequent pages.

While Christendom was still in its Dark Age, the Arabic Scholars of Islam began to display a remarkable activity in the department of medicine. Between the ninth and the twelfth centuries, when Arabian Medicine reached its maturity, Islam was possessed of medical literature which was rich both in quantity and variety of form.

The Arabic scholars who were centred on Cordova in Moslem Spain became famous teachers and authors, and there was a natural tendency for the students of Christendom to obtain the wisdom of the Ummayyad Caliphate, despite the spirit of antagonism to the Saracen which, in the year 1096, led to the initiation of the Crusades which, however, were directed against the 'Abbāsid Caliphs of Baghdad who held sway over the Holy Land.

The fact that the Jews were leading lights of the medical fraternity of Spain from the ninth to the eleventh century, and also that Jews were greatly esteemed as physicians in Latin Europe, combined with the idea that the Crusades were directed against the Moslems of the East, gave the Hebrews their opportunity of developing the medical side of their education.

The earliest Eastern influence is discernible in the work of a Jew DONNOLO (SABBATAI BEN ABRAHAM), who lived between the years 913 and 970. Donnolo was a Jew of Otranto and

ancient times the four elements were often represented by certain prismatic colours, white for *air*, blue for *water*, purple for *earth*, and crimson for *fire* (cf. George Oliver's *Signs and Symbols*, Grimsby, 1826). In ancient times the doctrine of the four elements was associated with Sabaism (star-worship), and it was the Arabian version of the doctrine that brought the subject into the secular sphere of studies ; it, however, retained its connexion with the science of medicine until the publication of the works of Copernicus and Vesalius in 1543 saw the undermining of this ancient doctrine in Europe.

practised in the South of Italy. He claimed to have studied "the sciences of the Greeks, Arabs, Babylonians, and Indians", and wrote two works, one on *materia medica* and the other on astrology, both of which unquestionably drew on Arabic¹ sources. The work on astrology, which is dated to the year 946, describes the doctrine of the macrocosm and microcosm:² his *materia medica*, or *Antidotarium*, has the distinction of being one of the oldest known medical works in Hebrew,³ and contains descriptions of some 120 remedies. In addition to his Eastern Travels, Donnolo travelled in the Italian peninsula, and thereby in all probability spread a knowledge of Arabic science.

The next evidence of Arabic influence in Latin Europe is a Latin document on astrology which bears the name *Alcandrius* (Alexander), and is dated 950. It consists of a single manuscript in which the occasional use of Hebrew script and the repeated use of the Hebrew equivalents for the names of the constellations and planets suggest that it must have passed through Jewish hands.⁴

After the works of Donnolo and *Alcandrius*, Arabic influence in Latin Europe appears to have lagged for a few decades, and it was not till the time of Gerbert (d. 1003), who spent some years in Northern Spain, later becoming Pope Sylvester II, that the Western Caliphate began fundamentally to influence the whole educational system of Europe.

Gerbert encouraged the use of the Arabic system of numbering, which gradually replaced the cumbersome Roman system in Europe. It is believed that he suggested a translation of an

¹ M. Steinschneider, "Donnolo," *Virchow's Archiv.*, xxxii, p. 65.

² D. Castelli, *Il Commento di Sabbatai Donnolo sul libro della creazione* (Florence, 1880).

³ The oldest medical work in Hebrew, says Garrison (*Hist. of Medicine*, 3rd ed., p. 137), is a book of remedies by Asaf Judæus, a Mesopotamian physician of the seventh century (see L. Venezianer), *Asaf Judæus*, Strassburg, 1916-17.

⁴ C. Singer, *Mediaeval Contributions to Modern Civilization*, p. 120.

Arabic work on the Astrolabe.¹ His mathematical works were probably an outgrowth of his studies in Arabized Spain.²

With the rise of the School of Salerno, which comes into prominence in the eleventh century, Latin Medicine began to show signs of rejuvenescence, and the practice of internal medicine, which had long sought sanctuary in the monasteries, became the special perquisite of the monks.

Gerbert was followed by Herman the Cripple (1013-54), of Richenau in Switzerland, who wrote works on mathematics and astrology, which display distinct evidence of Arabic influence, and this, despite the fact that Herman was suffering from physical infirmities which hindered him from travelling among the Arabian scholars of Spain and elsewhere. The work of Herman would suggest that the material showing Eastern influence was conveyed to him by wandering scholars of the type of Donnolo and *Alcandrius*.

The process of Arabic Infiltration is also seen in the *Lapidary*, or *Liber lapidum*,³ of Marmod of Anjou (1123), and in the poem on the use of herbs entitled *Macer Floridus*,⁴ attributed to Odo of Meune (d. 1161). With Marmod and Odo we come to the last of the mediaeval writers associated with the First Arabian Impact on the medical system of Europe.

¹ *Ibid.*, p. 120.

² N. Bubnov, *Gerberti Opera Mathematica* (Berlin, 1899).

³ The *Liber de gemmis* or *Lapidarius* of Marmod describes the medical virtues of some sixty precious stones, e.g. sapphires, beryls, and jasper. Choulant in his *Bücherkunde*, § 69, supplies us with much material on this work. A recent publication, *Magical Jewels of the Middle Ages and the Renaissance, particularly in England*, by Joan Evans (Oxford Univ. Press, 1923), is suggested to those interested in the history of this curious subject, for it is a 'veritable lapidary of lapidaries'.

⁴ The compilation *Macer Floridus*, which was frequently translated, describes the therapeutics of some 77 simples, was also known as *De virtutibus herbarum*, and "was the original of the oldest Scandinavian medical writing" (Garrison).

CHAPTER VII

THE TIDE OF ARABISM IN THE INTELLECTUAL CURRENTS OF MEDIAEVAL EUROPE

We have shown in the previous chapter the signs of the approaching tide of Arabism, commencing as it did in distant murmurs which gradually developed into the full tide of Arabic teaching in the Latin West. As will be demonstrated later, the Arabic teaching in the West of Europe did not convey to the mediaeval mind a true conception of European thought; nevertheless, it were these "perversions", as they are sometimes called, that eventually exercised a dominating influence over the medical system of Europe and over learning generally.

The vague rumours referred to in the previous chapter grew in volume, and among those who drew on them were Bernard Sylvestris (c. 1155); these were supplemented by the barbarous Latin versions of the Arabic works, e.g. the writings of Constantinus Africanus (1020-87), and finally, the work of the translators who worked at Toledo after its capture by the Christians, and its raising to the dignity of the capital of the Kingdom of Leon and Castile, completed the translation of Arabic Medicine to the medical system of Europe.

The Christian West was ripe for the germination and vigorous growth of Arabic Culture, which appeared as a constellation in the South of Spain. The rays of intellectual light came to Europe at an opportune moment in its declension, and despite the prevailing bigotry in Christendom, the Cordovan Caliphate gradually overcame many objections and obstructions, until finally its intellectual heritage became that of Europe generally.

In the twelfth century the foundation for the establishment of medical faculties and the granting of medical degrees was laid by Roger, the founder of the Christian Kingdom of Sicily, who enacted, in 1140, that everyone who desired to practise medicine must, under pain of imprisonment and confiscation of goods, present himself before a magistrate and obtain authorization. Other rulers of Christendom followed his example, and these measures ultimately led to the specialization of the study of medicine and the granting of degrees by the medical faculties of universities. The inception of the idea of the regularization of medical practice by Roger of Sicily was probably related to his Arabist leanings, for the Arabs had a loose system of licensing in vogue three centuries previously. The beginnings of the system of medical¹ examinations are thus to be sought among the Arabs.

But there was another connexion by which Sicily and Italy were living with a learned past: the fact that Southern Italy and Sicily formed parts of Magna Græcia explains the Hellenistic character of Salernitan medicine. The legend of the four-fold origin may have had this amount of truth that there were people who united these qualities, thus Donnolo spoke Arabic and Greek, wrote Hebrew, and travelled among the Latins. Tradition has it that Arabic teachers had settled at Salerno early in the eighth century.² The three main European sources, however, of Greek Medicine in its Arabian dress were Sicily, Toledo, and Cordova. Of these the Arabized version of Greek Medicine as derived from the Western Caliphate represented to the mediaeval scholars of Europe the most faithful tradition of ancient learning and the translating movement, which has its centre at Toledo formed the principal source from which the Middle Ages derived such medical and philosophical ideas as she possessed.

There was no direct contact between Latin Europe of the

¹ Puschmann, p. 181.

² Freind, *Hist. of Physick*, pt. ii, p. 218.

Dark Age and the Greek centre of Byzantium, with the result that the Greek language became a diminishing quantity in Italy and Sicily, so that the purer sources of classical culture were not as freely available as the works of the Arabic writers with their Arabized versions of the Greek medical writings. Greek, however, was a spoken and written language in Southern Italy in the time of Roger Bacon (1214-94), and translations direct from Greek were made in Sicily as early as the twelfth century. The knowledge of Greek became rare in Italy by the year 1360. Petrarch in this year was able to name scarcely ten men of learning in Italy who were acquainted with it.¹

The documentary evidence shows that prior to the Norman conquest of Sicily, the School of Salerno was free of Arabist influence. The work of Gariopontus (c. 1050), however, i.e. *Passionarius Galeni*, was perhaps distantly influenced by the Arabians, for in this work is the first mention in Latin Europe of anæsthesia by inhalation, a process known to the Arabic writers; Sudhoff does not consider this a genuine Salernitan writing.

Besides the *Passionarius Galeni*, the earlier Salernitan writings include the *Practica* of Petroncellus, and the poem *Speculum hominis*; these three are relics of the Salernitan writings before the time of Constantinus Africanus. The *Passionarius* is said to be an almost literal translation of a work by Theodore Priscianus of Constantinople.² During the ninth century many of the Greek writings that were brought to the court of the Caliph al-Mamūn at Baghdad from Constantinople are said to have been translated from the Arabic into Latin for the benefit of the Latin West; Jourdain³ in his *Sur l'âge et l'origine des*

¹ G. Voight, *Die Wiederbelebung des classischen Alterthums* (Berlin, 1881), ii, 107.

² *The School of Salernum—Regimen Sanitatis Salernitanum*. The English version by Sir John Harington: *History of the School of Salernum*, by F. R. Packard; and a note on the Pre-history of the *Regimen Sanitatis*, by F. H. Garrison (New York, 1920), p. 14.

³ *Op. cit.*, i, 48.

traductions latines states that long before the time of Constantine these Latin versions reached Salerno ('the city of Hippocrates'); these earlier Latin MSS. are now completely lost, that is if they ever existed. It is a remarkable fact that Cassiodorus (c. 490-585), writing long before Constantine (c. 1020-87) began his literary work at Salerno, advises the reading of *Hippocrates and Galen in Latin translation* (Inst. divin. lect. i, c. 31). The historical fact that the medical literature of the Dark Age, as far as written records show, did not include the Hippocratic or Galenic writings after their having been mentioned by Cassiodorus in the sixth century, and that the next mention of them in relation to the Latin West is in the legend that in the reign (815-33) of the Caliph al-Ma'mūn, who founded the 'House of Science' at Baghdad and fostered Greek Medicine, Latin translations of the Greek words were prepared for the teachers of the West, would suggest that it is quite possible that the Latin version of Hippocrates *Aphorisms* that was used for teaching purposes at Chartres in A.D. 991 was derived from Arabian sources.¹ On the other hand the example of Cassiodorus was followed by the priesthood of the Dark Age, and this Hippocratic work may have been a relic of earlier times that was collected and preserved in the monasteries during the turmoil and strife following the death of Charlemagne (814). The fact of this work reappearing in Europe long before the time of Constantine would suggest that there is some truth underlying the Arabian legend associated with the time of al-Ma'mūn. It will be as well to point out that Cassiodorus in his *Institutiones divinarum et humanarum literarum* (sixth century), which contains a brief outline of the liberal arts, mentions both Hippocrates and Galen, and though his erudition is said to be dis-

¹ NOTE.—The legend that some countrymen of Johannes Scotus (Erigena) produced Gaelic versions of Hippocrates and Galen some time between the years 875 and 901 is of interest in this connexion, and has been referred to in the preceding chapter.

figured by inaccuracies, it may be possible that the Hippocratic work used at Chartres during the last decade of the tenth century may have been one of the Latin translations edited by Cassiodorus five centuries earlier; none of these early Latin MSS., however, are now extant.¹ Further, in this connexion, it might be mentioned that Alcuin (d. 804), the most eminent of the Anglo-Saxons of the Central Period of the Carolingian Renaissance, mentions Hippocrates, and is said to have collected MSS. in Italy.

The advent of Constantine among the Latin sponsors of Græco-Arabian Medicine in the year A.D. 1070, synchronized with the era following the zenith of the reputation of Salerno as the 'Civitas Hippocratica'.

With CONSTANTINUS AFRICANUS (c. 1020-87) we come to the first of the Latin translators of the West. Constantine, though he early abandoned Salerno, greatly influenced Salernitan writings.

The story of Constantine the African who lived in the world of adventure and learning associated with the great religious movement of the tenth century, is one of the most fertile sources of romantic material which has up to quite recent times been locked within the pages of ancient MSS. Born at Carthage, he returned to his native city after many years of travel, the greater portion of which were in the status of a slave; but being armed with "the knowledge of the sciences of the Greeks, Babylonians, and Indians", he acquired a degree of learning far in advance of his own countrymen in Carthage, and was accordingly, as was the wont throughout the world in those days, suspected of sorcery and had to flee.

¹ A point of fundamental importance in the study of the history of Hellenism and its movement to the Latin West, is that the bulk of the Greek MSS. extant are later than the Latin (cf. L. Thorndike's *History of Magic and Experimental Science*, Macmillan, 1923, p. 121), and that the Arabic MSS. are earlier than the Latin. The significance of this will be developed in the course of this work.

Making his way to Europe about the middle of the eleventh century, he obtained service as secretary to Robert Guiscard, the Norman Ruler of the Two Sicilies, because of his extensive knowledge of languages, among which were Arabic and Latin. The court life was not congenial to Constantine, and he retired to the cloisters of Montecassino in 1070, where he spent the remainder of his life in rendering into Latin the scientific writings of the learned world of the tenth century.

Though his Latin renderings are not considered very satisfactory interpretations of the Græco-Arabic writings, Constantine was one of the most important figures in the history of the mental development of Europe in the Middle Ages.

Constantine's literary work earned him the title of 'Orientis et occidentis doctor': his Latin works were the 'Pantegni' (in xii books) which was a portion of the Royal Book of Haly Abbas, mistranslations of the 'Book of Definitions', the 'Book of Elements', and the 'Book of Diet' of Isaac Judæus, 'Chirurgia,' 'Prognostica,' 'De pulsibus,' 'De instrumentis,' 'Practica' (in xii books), 'Liber graduum,' 'De Stomachi et intestinorum infirmitatibus,' 'Liber de urina,' and a number of others.¹ A tabulation of Constantine's work is to be found in the writings of Petrus Diaconus of Montecassino (Puscinotti, Stor. d. Med. 11, p. 304).

Constantine was steeped in Arabic Culture, and this at a time when Islam was thoroughly hated in Christendom (the Crusades

¹ The following is a complete list of the Latin works of Constantinus Africanus that are known: *Pantegnum* (in xii books), *Practica* (in xii books), *Liber Graduum*, *Diæta ciborum*, *Liber febrium* (a translation from the Arabic), *Liber de urina*, *Liber interioribus membris*, *De coitu*, *De instrumentis*, *Vadicum* (in vii parts), *De stomachi et intestinorum infirmitatibus*, *De infirmitatibus hepatis, rerum, vesicæ, splenis et fellis*, *De his, quæ in generativis membris nascuntur*, *De omnibus, quæ in externa cute nascuntur*, *exponens aphorismi librum*, *Tegni*, *Magategni*, *Microtegni*, *Antidotarium*, *Disputationes Platonis et Hippocratis in sententiis*, *De simplici medicamine*, *De Gynæcia id est de membris ac corporis feminarum*, *De pulsibus*, *Prognostica*, *De experimentis*, *Glossas herbarum et specierum*, *Chirurgia*, *Liber de medicamine ocularum* (cf. Friedrich Hartmann's *Die Literatur von Früh- und Hochsalerno*, Leipzig, 1919, pp. 11-14).

began in 1096) and the Moslem rulers of Sicily were frequently menacing Salerno ; it is possible that these reasons led to clerical pressure being brought to bear on Constantine compelling him to suppress the name of the Arabic authors whose works he produced Latin versions of. His writings included versions of Haly Abbas, Isaac Judæus, Ibn el-Jazzar, as well as the Arabized Hippocrates and Galen ;¹ it is of importance to the history of Arabic influence on the medicine of Mediaeval Europe that Constantine did not know the *Canon* of Avicenna.

The first Latinizer of Arabic Culture, the effects of his pen were far-reaching and were as Sudhoff says " a symptom of a great historic process " which Singer describes as " the Arabic Infiltration ". The chief effect of his translations was the great attention paid to Arabic materia medica and polypharmacy in the later Middle Ages. Though he failed to quote his sources and though his Latin was defective, a century later his writings revived the study of Hippocrates and Galen in Europe. Even after the two Gerards who worked at Toledo had produced their more accurate and fully credited translations of the Arabic works, the versions of Constantine continued to be read as authoritative and standard works. The library catalogue of 1160 at Hildesheim² shows that the medical works (at least up to this time) were exclusively the translations of Constantine, who deeply³ influenced the School of Salerno.

Neuburger divides the Medical Middle Ages into four periods : the Monastic Period from the fall of the Western Roman Empire (476) to the end of the tenth century, the Salernitan Period covering the eleventh and twelfth centuries, followed by the periods of Arabic Infiltration and Domination.

The School of Salerno, which must be credited with having arrested the decline of the science of medicine when learning

¹ M. Steinschneider, *Virchow's Archiv*. (Berlin, 1866), xxvii, pp. 351-410. Steinschneider discusses the Arabic sources of Constantine.

² K. Sudhoff, *Arch. f. Gesch. d. Med.* (Leipzig, 1916), ix, p. 348.

³ *Ibid.*, p. 348.

as a whole was falling into decay, was a secular corporation surrounded on all sides by monastic institutions. During the eleventh and twelfth centuries Salerno upheld the medical traditions of the West, and constituting as it did the direct bridge between Ancient and Modern Medicine, as apart from the more circuitous route through Byzantium, Baghdad, and Cordova, Salerno was able for a time to withstand the growing influence of Arabic teaching which, however, gradually became dominant at this "mother of European Universities".

The best known production of the School of Salerno was the *Regimen Sanitatis*,¹ later known as *Flos Medicinæ*. This work prior to the discoveries of the Breslau Codex, was regarded as the best means of learning Salernitan knowledge. It exercised some influence upon mediaeval literature, commented upon, published, and translated. The clinical instruction and therapeutic advice is contained here in the form of short verses in order to facilitate their being easily memorized. The poem in its original form comprised only a relatively small number of such verses. At the time of Arnold (1311) it contained only 362, but has been added to by later commentators until finally it comprised 2,130 verses.

De Renzi added a large number of those obtained from various sources, so that it swelled under his editorship to 3,520 verses.

According to Sudhoff (Einf. in d. Gesch. d. Med. S. 172), this work is based on earlier literary writings produced at the

¹ A Latin text of the 'Regimen Sanitatis Salernitanum' was published at Strassburg in 1491 under the following title: 'Regimen Sanitatis, cum expositione Magistri Arnaldi de Villa Nova. Incipit Regimen Sanitatis Salernitanum excellentissimum pro conservatione sanitatis totius humani generis perutilissimum: nec non a Magistro Arnaldo de Villa Nova Cathelano omnium medicorum viventium gemma, utiliter, ac secundum omnium antiquorum medicorum doctrinam veraciter expositum: noviter correctum ac emendatum per egregiosimos ac medicinæ artis peritissimos Doctores Montispeasulani regentes, anno MCCCCLXXX predicto loco actu moram trahentes.' Closing with the following, 'Hoc opus optatur quod flos medicinæ vocatur. Tractatus qui de Regimine Sanitatis nuncupatur finit feliciter, impressus Argon: Anno Domini MCCCCXCI, in die Sancti Thomæ Cantuariensis. Apud me.'

beginning of the twelfth century by the baptised Jew John of Toledo, Latinized and given to the world as *Epistola Aristolatis ad Alexandrum de conservatione corporis humani* or as *De regimine sanitatis*, and in the course of a few decades translated into prose and verse in the vernacular of practically all European peoples. The 'Regimen' became a *vade mecum* for the educated physicians for many centuries after its compilation, and as many as 240 editions are said to have been published.

Of the other writers of the later Salernitan period, JOHANNES AFFLATUS (1040–1100) was a Saracen pupil of Constantine and wrote the tract *De febris et urinis*. The other Salernitan works which have been given very fully by Friedrich Hartmann (cf. his "Die Literatur von Fruh-und Hochsalerno", Leipzig, 1919) include the "Tractatus de ægritudinum curatione", which was written by many authors and, as Garrison says, was the first Latin example of an encyclopædia of medicine: this became the standard textbook of internal medicine in the first half of the twelfth century. The "Compendium Salernitanum" ¹ discovered in manuscript in 1837 is the earliest medical writing of this school that is extant, and its contributors include Johannes Afflatus.

COPHO of Salerno (early twelfth century), who contrary to the usual statements was not a Jew, is credited with a work entitled *Ars Medendi*, and another on the anatomy of the pig;

¹ The following lines from Harington's translation, published in London in 1608, are of interest as giving an idea of the introduction to the *Regimen*.

"The Salerne Schoole doth by these lines impart
All health to *England's King*, and doth advise
From care his head to keepe, from wrath his heart,
Drink not much wine, sup light, and soone arise,
When meate is gone, long sitting breedeth smart;
And after-noone still waking keepe your eyes.
When mou'd you find your selfe to *Nature's Needs*,
Forbeare them not, for that much danger breeds,
Use three Physicians still; Doctor *Quiet*,
Next Doctor *Merry-man*, and Doctor *Dyet*."

this, says Hartmann,¹ is erroneous, as the work in question was written by ARCHIMATTHÆUS, while the anatomy of the pig appears in the appendix of the oldest edition (Haganoæ 1532, u Argent. 1534) of the *Ars Medendi*; there is no ground to suppose that Copho and not Archimatthæus was the author of this work (cf. F. Hartmann's Thesis, p. 14). RICARDUS wrote *Anatomia*, a work based on porcine dissection, and both these works indicate the degradation of the science of anatomy at this time. The Arabians, it should be noted, relied entirely on Galen for their anatomical knowledge at this time, so that the study of this most important subject languished. NICHOLAS PRÆPOSITUS wrote the *Antidotarium (Parvum)*, which contains about 150 prescriptions arranged in alphabetical order, showing their method of administration and action: it was based on Arabic materia medica with its tables of weights and measures: this work formed the basis of later pharmacopœas and was translated into Italian, Arabic, Hebrew, and other languages, and was the standard textbook on materia medica for many centuries in Europe. A large number of criticisms are devoted to explaining and amplifying the contents. Numerous impressions of this work exist, for example, *Venet. 1471, 1497, 1532*.

The work of Nicholas contains the foundations of our apothecaries' weights and measures, i.e. 20 grains = 1 scruple, and 3 scruples = 1 drachm; it is important to note that this work contained the Arabic formula for the "soporific sponge", which was used to produce anæsthesia by inhalation; this formula was later mentioned by Theodoric of Bologna who got his knowledge either from Nicholas or direct from Arabic sources. A second *Antidotarium (Antidotarium magnum)* has been erroneously ascribed to Nicholas: this work was by Nicholas Myrepsos.

At about this time lived ÆGIDIUS CORBOLIENSIS who wrote

¹ F. Hartmann, *Die Literatur von Früh- und Hochsalerno* (Leipzig, 1919), p. 14.

several medical poems in Latin hexameters ; he is known to have been a teacher at Salerno for a time.

The names JOHN and MATTHÆUS PLATEARIUS frequently occur in the records of this school, and considerable doubt exists as to their life and works. The *Antidotarium* of Matthæus is said to be the original of the first French herbal *Le grant herbier*.

A work entitled *De mulierum passionibus*, over the authorship of which there appears to be great doubt, has been ascribed to TROTULA, the wife of John Platearius ; this work is a treatise on gynæcology and cosmetics. Another work, entitled *De natura seminis hominis*, is ascribed to ABELLA. With these two women we come to the last of the early Salernitan writers in the period of medical history preceding Arabian Influences.

About the year 1155, BERNARD THE PROVINCIAL wrote a commentary on therapeutics which drew on Arabic sources. The latter half of the twelfth century was marked by a curious treatise on dietetics by Musandinus ; at this time lived John of St. Paul, one of the teachers of Gilbert the Englishman, who was a contemporary of Urso, who was an authority on the pulse and urine, the principal diagnostic weapons of the Middle Ages (Singer).

Among the more prominent writers of Salerno, who numbered over twenty-three, after the time of Constantine, were Johannes Platearius, Trotula, whose writings were based for the most part on Constantine and who has come down to us as the Dame Trot of children's books, Bartholomew, Mathew of Archiepiscopo, Mathew Platearius, *Farragut*, Maurus, Romulduus Guarana, John of Saint Paul, Roger of Salerno, and Jamerius.

After the sack of Salerno in 1194 by Henry VI, the medical school of Salerno began to degenerate. This process received a further impetus in 1224, when Frederick II founded the University of Naples to which all Neapolitan subjects were expected to give preference. In the thirteenth century the foundation of the Universities of Palermo and Montpellier

further detracted from the attractiveness of Salerno, and from now on 'the mother of European Universities' began to decline, until finally it was reduced to a state of insignificance by a decree of Napoleon on the 29th of November, 1811, though, as Baas says, after this decree Salerno still had its Collegium Medicum, which was later revived by the Bourbons. Montecassino was declared a National Monument in 1866, and its library (*Bibliotheca Casinensis*) contains a most valuable collection of books, charters, and MSS.

The 'manual art of surgery' prior to the introduction of the *Canon* of Avicenna to the Latin West formed one of the lesser and more neglected branches of Medicine. Theodoric, king of the Visigoths, among other of his edicts, had laid down that if a patient died from the results of an operation the surgeon concerned should be handed over to the relatives of the deceased who could do with him what they pleased; this rule was in force from the sixth to the twelfth century, and chiefly affected the lower type of surgical practitioner. This attitude towards 'the manual art of surgery' tended to its degradation, and though Arabist doctrines (as interpreted from the Latin translations of the Surgery of Albucasis of the Western Caliphate) tended to remove surgery from the hands of the 'uncultivated' in the thirteenth century, the Arabic writers East or West added little that was original to medicine or anatomy.

Commencing with Avicenna, the mediaeval Arabists pushed Galen's dictum that surgery was an inferior branch of medicine and treated the surgeon as a lackey and inferior. The Arabic commentators of Galen and the mediaeval Arabists held that under certain conditions the human body was *unclean*. This tenet gained ground and culminated in the edict of Tours (1163), "Ecclesia abhoret a sanguine," and finally led to surgery being relegated to barbers and mountebanks.

The Arabic commentators of Galen imposed the idea that 'coction' (suppuration) and 'laudable pus' were essential

to the healing of wounds, so that surgery became a meddlesome and perilous undertaking. These Arabist doctrines formed the basis of the theories on salve-surgery that were universally held by the mediaeval practitioners of Europe during the High Scholastic Period.

With Avicenna, however, we find a branching out of surgery, and the issue of purely surgical works; the earliest of these writers on surgery were Roger, Roland, and the so-called 'Four Masters'. ROGER wrote his *Practica Chirurgiæ* in 1180, and this work was re-edited by ROLAND about a century later (1284). Allbutt¹ regards this work as "no mere re-cooking of Albucasis". Roger's tract on surgery owes much to the *Viaticum* of Constantinus Africanus. The question as to who were the Masters of Surgery who wrote the Salernitan treatise entitled 'The Glosses of the Four Masters on the Surgery of Roger and Roland' is a matter of speculation. There are two manuscripts of the Four Masters in Cambridge: the volume in Peterhouse Library is entitled *Cirurgia iiii magistrorum cum additionibus Rolandi*. This essay, says Allbutt,² is evidently a professor's copy, and is neatly illuminated and rubricated; the Peterhouse writer gives the date as 1230 and entitles the work as that of Roger and the three other masters.

In the year 1252, BRUNO THE CALABRIAN completed his *Chirurgia Magna* at Padua, where an university had developed by A.D. 1222; Bruno also wrote a work entitled *Chirurgia Parva*; these were the first³ Latin treatises to definitely draw on the *Canon* of Avicenna; Bruno, according to Guy de Chauliac,⁴ combined the theories of Galen and Avicenna with the practice of Albucasis "but he had no complete translation of Galen"

¹ T. Clifford Allbutt, *The Historical Relations of Medicine and Surgery* (London, 1905), p. 27.

² *Ibid.*, p. 27 (footnote).

³ The propinquity of Calabria to Sicily will be noted.

⁴ E. T. Withington, *Med. Hist. from the Earliest Times* (London, 1894), p. 207.

and he "entirely omitted anatomy". Allbutt¹ describes this work as "a motley blend of Hippocrates, Galen, Paul of Ægina, and the Arabs". It is of interest to draw attention to the fact that Severinus, according to Freind,² described the writers of this age as *Arabistæ*, so that the former is the first to use the term 'Arabist'.

In Italy the influence of Avicenna appears before Albucasis and is definite in the first half of the thirteenth century; a little later the influence of Albucasis is noted along with Rhazes and Avicenna in the so-called glosses of the "Four Masters" and in the surgery of Roger and Roland which was issued in 1230; Sudhoff³ points out that in early Roger glosses (first half of the thirteenth century) an early knowledge of Albucasis is seen; Baas⁴ and Freind⁵ assert that Roger borrowed his surgery from Albucasis or Paul of Ægina. It is stated that Roger had only Constantine among the Arabs to rely on, but the latter, as already mentioned, translated Haly Abbas, Johannitius, Ibn el-Jazzar, and the Arabized Greek medical writings into Latin. The Arabic sources of Roger are undoubted, and thus it was that Roger, the ultimate source of all the earlier Western surgeons, permeated the medical system of Europe with Arabist ideas. Roger was a believer in moist dressings,⁶ a fact which has an important bearing on the salve surgery of Mediaeval times.

Roger's *Practica Chirurgiæ* became the recognized textbook on the subject in Italy, until it was replaced by the surgical tractates of Albucasis.

Bruno the Calabrian, who followed Albucasis in his remarks on amputation for gangrene, advocated the dry (aseptic) treat-

¹ *The Historical Relations of Med. and Surg.*, p. 25.

² *Hist. of Physick*, pt. ii, p. 301.

³ *Geschichte der Medizin im Überblick mit Abbildungen* (Jena, 1921), p. 201.

⁴ *Outlines of the Hist. of Med.*, English translation by H. E. Handerson (New York, 1889), p. 299, footnote 3.

⁵ *Hist. of Physick*, pt. ii, p. 301.

⁶ J. H. Baas, *Outlines of the Hist. of Med.*, p. 299.

ment of wounds. The 'wet' or 'coction' system of treating wounds was widely taught in Western Europe at this time, in conformity with the Arabist theories on the subject: this meddlesome treatment, however, found other opponents in Hugh of Lucca (c. 1250) and Theodoric of Bologna (1206-98), and later it was opposed by Henry de Mondeville and Paracelsus, until finally the teaching and practice of Lister¹ saw the end of the Arabist doctrine. The writings of the earlier of these medical authors did not make a very marked impression on the belief in 'coction' among the surgeons of Europe.

The two surgeons Hugh of Lucca and Theodoric of Bologna, who are earlier than Bruno, do not use Albucasis, while William of Saliceto, Lanfranc of Milan (a believer in the actual cautery who influenced surgery in France), and Henry de Mondeville, all earlier than Guy de Chauliac, use Albucasis a great deal; Yperman of Ypern (1297-1329) was a pupil of Lanfranc and later became one of the principal figures in mediaeval surgery among the Dutch.

Guy de Chauliac made extensive use of Albucasis, and reduced Arabian surgery to a system; he also made use of the *Canon* of Avicenna, and did not confine himself to surgery proper.

Haly Abbas appears as the *Pantegni*, a Latin translation in twelve books by Constantine. Constantine does not mention the name of Haly Abbas; the name was first mentioned in Latin in 1127 by Stephen of Antioch in his translation of the *al-Maliki*. In a general sense, we see that the Arabic knowledge issued by Haly Abbas had been drawn upon at the end of the twelfth and early thirteenth century. The spread of Haly Abbas' surgery (in Latin translation) was made possible before the year A.D. 1100 by Constantine, but was better noticed in the twelfth century. It just so happened that the spread of Arabic learning in Italy coincided with a renaissance of native

¹ Lister, *The Lancet*, 1867, vol. ii, pp. 353 and 688.

Italian thought, the latter being highly expressed in the work of Saliceto.

Another work, the *Methodus Medendi* of Galen, i.e. the *Megatechne*, came over from Toledo in the thirteenth century in a translation by Gerard of Cremona; this translation is contemporary with the work of Roger of Salerno. The *Methodus Medendi* has been twice translated, once by Constantine and again by Gerard of Cremona. Among the earlier surgical works is a translation from the Greek into Latin of Galen's spurious *Isagoge* (probably in the twelfth century). One of the most famous surgical MSS. is that of Roger of Salerno in a French translation (SLOAN, 1977); this is a most beautiful manuscript, and dates about the middle of the thirteenth century. Roger's work appeared in the eleventh, and was issued in the thirteenth century.

THEODORIC OF BOLOGNA introduced to Latin Europe the treatment by mercurial inunction (*unguentum sarracenicum*) and also the sparing use of the actual cautery, and apparatus for fractures and dislocations, and this at a time when the two latter were freely used by the medical profession of the West of Europe. Theodoric's name is also associated with the Arabist formula for the 'soporific sponge'.

WILLIAM OF SALICETO (1201-77), who was commonly known as Saliceto or Salicet, and as Placentinus, was an able Italian surgeon in whose work was fully expressed the native Italian renaissance combined with the Arabist teaching that was felt throughout Western Europe. Guy de Chauliac says that Lanfranc "wrote a book containing little else than what he got from William but he changed the order". Saliceto, who makes use of Albucasis, also practised dissections; the latter aspect of his work will be referred to again in a later chapter.

The time of Saliceto coincided with the development of the great mediaeval universities. It might be as well to point out here that the term *universitas*, until about the latter part

of the fourteenth century, applied to the scholastic guilds within the *studia generalia*, and that as the Middle Ages progressed the distinction between the two terms was lost sight of. The scholastics of mediæval times were mostly men of mature judgment who had attained to some degree of excellence in some walk of life, if we may judge from the fact that they were permitted to select their own tribunals in cases of dispute, and also often selected their own "rectors", and even founded "universities" such as Oxford and Cambridge.

The 'studium generale' in Paris was founded in 1110, Bologna in 1113, in 1167-8 there was a migration of students from Paris to Oxford to form a 'studium generale', and in 1209 there was a migration from Oxford to Cambridge for a similar purpose. The universities of Montpellier (1181), Padua (1222), and Naples (1224) were formed about this period. Contemporary with these events the renaissance of native Italian thought and the spread of Arabic learning in the Latin West, led to what has been described as the "brilliant false dawn of culture and liberalism in the thirteenth century".

The Arabist Culture with its leanings on the works of Aristotle and Galen, to mention the most popular Greek authors of ancient times, did not satisfy the thirst for knowledge in Christendom and with the commencement of the thirteenth century we find ourselves with the early experimenters, e.g. Witelo the Pole, Adam Marsh, Roger Bacon, Pecham, Saliceto, and Theodoric of Bologna. The universities were now firmly established, and the European Scholastics sought their learning from the Arabist sources, this being the only channel at that time through which the culture of Ancient Greece could be obtained. Prior to this *new learning*, Christian Europe depended solely on certain treatises of Aristotle, Porphyry, Martianus Capella, and Boethius, which were instrumental in saving Western thought and literature in its relation to antiquity from extinction. The Latin translations of Hippocrates and Galen advised by Cassiodorus were lost

(and have not since then been rediscovered) so that the Scholastics of the West were compelled to seek their learning from the only source available at that time, which happened to be the works of the Græco-Arabian writers of Islam whose writings had accumulated in Moslem Spain, which were supplemented by the Latin versions of Constantine.

The respect for ancient learning and the idea that the Arabic literature embodied the same gradually led to the unreasoning reverence for Arabist doctrines for which the foundation had been laid by the circumstances that had prevailed during the Dark Age. The great body of Arabic medical and philosophical literature having been translated into Latin it was approached with a great and growing enthusiasm combined with a blind trust in authority, and transmuted by the high scholastics, Hugh of St. Victor, Robert Grosseteste, Bartholomew and others, who built a dogmatic exposition upon it. During the post-Moslem period of the Middle Ages, Seville was an important centre for the study of Arabic and other Oriental languages, and further translations of the Arabic works were made there; the medical publications of the University of Seville, however, had no influence on the medical system of Europe, for by the fourteenth century Latin Europe had no further occasion to look to Andalusia for its textbooks.

The writings of Mesuë Junior and Pseudo-Mesua (see Ch. IV) and Jābir ibn Ḥayyān or Geber (see Ch. III) are most significant, for while it is generally considered that the former never really existed, and that many original treatises appeared in the Middle Ages purporting to be written by Geber, demonstrate that in order to attract attention in the Latin West, an Arabian association or origin was a *sine qua non*.

✓The result of the Arabic domination in the intellectual sense was that up to the end of the sixteenth century, the medical curriculum of the Universities of Europe demanded a knowledge of Avicenna's *Canon*, Galen's *Ars Parva*, Hippocrates' *Aphorisms*,

and Dioscorides; Arabist surgery is said to have survived, however, until the time of Ambroise Paré (died 1590),¹ after which the surgery of the West began to profit from the revivifying of the sciences by the modern experimenters. The *materia medica* of Serapion and Mesuë were consulted up to as late as the beginning of the eighteenth century, and to this day, the voluminous pharmacopœias of Europe, with their tables of weights and measures are largely based on the original Arabist ideas.

In the early part of the Scholastic Period, the difficulty of the Arabic language was a barrier to the direct transmission of Arabian Medicine to the Latin West. Bacon, who copies from Herman the German, states that Michael Scot did not know Arabic and that his translations were really the work of the Jew Andrew, himself failed to find the key to Arabic grammar, and it is certain that the knowledge of Arabic among the Westerns was insufficient for the effective translation of Arabic works on medicine and the other sciences, until at least the latter part of the twelfth century.

¹ A collection of his works was published at Paris in 1575. For a fuller account of this surgeon, the reader is referred to Stephen Paget's *Ambroise Paré and His Times*, London, 1897.

CHAPTER VIII

THE LATIN TRANSLATORS AND THE COLLEGE AT TOLEDO

The translators of the "House of Science" at Baghdad whose work is of capital importance in the history of medicine, have been dealt with elsewhere in this volume ; the introduction of these Arabized works to Spain and their subsequent translation into Latin, principally by the society of translators at Toledo, forms but the next step in the history of Hellenism through the circuitous Arabian route, as opposed to the direct or Byzantine route which, commencing after the year A.D. 1204, gradually displaced the Arabized Greek writings as derived from the *great translating centre* at Toledo. These Toledan Latin translations,¹ despite the fact that they were in the main none too accurately translated, as will be presently shown, were the sources of the High Scholastics Albertus Magnus and St. Thomas Aquinas ; the fact of these translations being three or four removes from the original Greek texts, having passed through Syriac and Arabic versions, is explanatory of the errors and misunderstandings of these great mediaeval thinkers.

The Castilian-speaking Jews took an important share in the translating movement, and also in making Averroës known to the South of France, and among the Jewish fraternity, the family of Ben-Tibbon were pre-eminent. The Latin translations of Averroës were read at the Universities of Paris and Bologna,

¹ These Latin renderings are discussed in a narrative form in this chapter, and those desiring still more detail are referred to Appendix I of this work, in which is given an alphabetical list of the principal Latin translators together with a full inventory of the titles of the Latin Translations of the Arabic works on medicine and philosophy.

and were the basis of the cult of Averroism up to the time of Martin Luther (d. 1546).

The two points of contact from which Latin Europe absorbed its knowledge of Arabian Medicine were Spain and, to a lesser degree, Sicily. Spain, with the exception of the small kingdoms of Leon, Castile, Navarre, and Aragon in the north-east, was under the rule of Islam (see map 2, Pl. I, of this work). Toledo which had passed under the rule of the Christians, had been largely Christian during the Moslem occupation, and when a series of translations began to flow from this seat of learning, Cordova still continued as the main centre of original Arabic Medicine and Philosophy, which at that time were taught together. During the post-Moslem period, Seville was an important centre for the study of Arabic and other Eastern languages, and further translations are said to have taken place at its University.

It should be noted that in the latter part of the history of the Western or Cordovan Caliphate, the natural linguistic medium of the educated Jews of Moslem Spain was Arabic, and some of these, such as Ibn Gabirol and the Rabbi Moses Ben Maimon, appear disguised as Avencebrol and Maimonides, while a large number of them who rose to their opportunity professed Christianity, and were the principal agents in the transference of the Greek heritage of the Moslems to the Latin West.

The close contact of the Latin and Arabic civilizations in the South of Spain, together with the blending of races (a process still in progress),¹ led to the archbishop Raymond who was

¹ Ignatius Phayre writing in the *Contemporary Review* (1922) says that *to-day*, the mixed races that form the bulk of the inhabitants of Spain from Corunna to Malaga cannot read or write, and that the lack of carriageable roads and good sanitation is the direct cause of a high death-rate in Spain; these facts are given here in order to bring out all the more, the premier position of Moslem Spain during the "golden age" of the Western Caliphate, not only as compared to the rest of mediaeval Europe, but the Spain of to-day.

in office at Toledo between the years A.D. 1130 and 1150, forming a "society of translators" (c. 1130 or shortly after), the working translators of which were converted Jews; this society was placed under the headship of the archdeacon Dominicus Gundisalvi, under whose care a vast amount of translating work was executed. The method by which these Latin translations were produced at Toledo was a word for word translation of the Arabic script; the working translators placed the Latin equivalent over the Arabic words, disregarding the sense of the original, thereby losing, to quote Dryden, "all the spirit in the tedious transfusion." When an Arabic word was encountered for which they were at a loss for a Latin equivalent, the former was transcribed bodily, with the result that such words as *alcohol*, *alchemy*, and *cypher* have been passed on to us; I shall be referring to this again. The working translators having completed their work, the Latinity was then reviewed by clerks who often put their names to the MSS., and it is for this reason that we often come across the statement that the work of certain Latin translators was really the work of Jews, though in itself it is quite insufficient data on which to base such a sweeping assertion.

The city of Toledo had been captured by the Christian ruler Alphonse of Castile in 1085, at a time when the intestine dissensions of the Arab aristocracy and the native Spanish Muslims of Spain, had rendered the territories of the Western Caliphate vulnerable. The fall of the city and the establishment of the society of translators under organized Christian supervision gave the pursuit of "Saracenic studies" among the Latin scholars of the West greater facilities and encouragement, and the Spanish Jews, whose linguistic medium was Arabic, both saw and took a very active part in the now commencing scientific translation of the Arabic writings on medicine and philosophy.

The tolerance of Raymond led to a considerable interest being taken in Arabian Medicine during his years of office and

after, owing to the increased facilities being offered to the Latin scholars who wended their way to Toledo. Just at this time Christians and Jews were fleeing from Cordova owing to the intolerance of the Almohad Caliphs of Cordova, and the commencing orthodox reaction in Islam. The Moslem masses in the West were content with the elementary medicine of the *Qur'ān*, and the advanced doctrines of the Western Arabic physician-philosophers placed the latter outside the pale of Islamitic tolerance. The Spanish Jews who formed the bulk of the Arabic physician-philosophers carried their doctrines to Europe after Islamatic orthodoxy had finally discarded them. Jewish learning was at its height from the tenth to the twelfth century, when we find such writers as Avencebrone and Maimonides, translations of whose works were made into Latin, and form a part of the Arabic writings that filtered into Europe at a time when the Latin intellect appears to have been in a state of somnolence. The Jews entered with great spirit into the scientific and medical heritage of Islam, speaking and writing as they did in the language of science and the *Qur'ān*; the practice of medicine and the sale of medicinal herbs at this time was a most lucrative business, and it is said that the development of Venice as a seaport for the trade with the Levant was largely due to the fortunes that could be made from the sale of the expensive and rare medicaments described in the polypharmacy of the Arabians. The Jewish colony at Montpellier at this time was a large one, and it is stated, though without sufficient foundation, that among the medical men of Montpellier in the tenth and eleventh centuries, were a large number of Jews and Arab practitioners.¹

By the twelfth century the tide of Islam had turned, and a general retreat began in the direction of Africa. This afforded opportunities to scholars such as Michael Scot and Gerard of Cremona to search out native teachers such as Andrew and Ibn

¹ Puschmann, *Hist. of Med. Education*, p. 212.

Ghalib. Previous to this the full benefit of Arabic teaching was not freely available to the scholars of Latin Europe. In connexion with the translation of the works of the Arabic writers, it is important to mention that many of the most important, including the *Canon* of Avicenna, had been translated into Hebrew, so that the assistance rendered by the Jews of Spain was presumably of the utmost value. The medical literature produced under the inspiration of the Western Caliphate or under its protection, was written either in Arabic or Hebrew, and many of the former being rendered into Hebrew, gave the Jews an opportunity to which they were not slow in rising, and thus it came that the converted Jews were the principal working translators at Toledo.

Among the early translators who visited Toledo before the foundation of the College of translators, were Adelard of Bath who was at Toledo about the year 1100; Adelard who also travelled in Sicily, translated the Arabic version of Euclid and published a compendium of 'Arabic Science'; he is important but not directly to us. Another who can be placed in a similar category was the Englishman, Robert de Retines, who translated the *Qur'ān* between the years 1141 and 1143. Adelard's method of obtaining the desired knowledge of his subject was probably that of making the acquaintance of a learned Jew who was familiar with Arabic and the local *patois*, and enlisting the services of a native assistant who helped in turning the vernacular version of the Arabic or Hebrew text into Latin. Long absence from the centres of Latin learning was probably the cause of most of these translations being so barbarous. Technical terms apparently offered great difficulty to the Western translators; when these were encountered they were transliterated in an Arabic or Hebrew form with the result that such terms as alchemy [الكيمياء], elixir [الإكسير], cypher [صفر], azure from the Persian—lāzhaward [لازورد], and many others were passed on to us, and are in use to-day.

The following instances of the mediaeval translation of the 'Latino-barbari' will illustrate the contention that these renderings did not truly convey Arabic thought to the mediaeval mind of Latin Europe. In the Latin translation of the *Qānūn* of Avicenna (*Venice 1544, f. 208 b.*) the Arabic *al-'Ishq* العشق (love) is rendered as *De Iluxi* with *Alhasch* as a marginal variant. The first section of the first discourse of the first part of the third book of the *Canon* is entitled 'Sermo universalis de Soda'; the Arabic *ṣudā'* [صُدَاع] means 'a splitting headache'; it will thus be seen to what controversial depths the top-heavy mediaeval scholastics with their love of wordy dialectics must have gone in their disputations on love and soda.

The Arabic culture that had been grafted on Latin Europe through the work of Donnolo, 'Alcandrius,' Herman the Cripple, Gerbert, the later Salernitans, Constantine, Adelaid, Marbod, and Odo of Meune, began to take root in the West. The desire to cultivate "Saracenic studies" encouraged the efforts of the translators who found that they received no encouragement from the Church. The emperor Frederick II (1212-50) of Sicily, in his struggle with the Papacy, drew to his court scholars whose pursuits were discouraged by the priesthood, and among those whom he welcomed was Michael Scot (c. 1170-1294), who had begun his Arabic studies at Palermo. Scot was the first translator of Averroës, and his version greatly influenced the European scholastics; he also translated several of Aristotle's works, and Avicenna. According to Herman the German, and later Roger Bacon, Scot enlisted the services of the Jew Andrew who assisted him in the translation of Avicenna; however, Scot was at Toledo in the year c. 1217, i.e. thirty-two years after its incorporation as part of the kingdom of Castile and Leon, and over thirteen years before the foundation of the society of translators at that city. Scot's Latin works include Averroës' *De cælo et de mundo* and commentaries on *Physics*, and the *De generatione et de corruptione*. ALFRED THE ENGLISH-

MAN (c. 1220) who belongs to the same group of translators, preserved a fragment of the Aristotelian school by translating the Aristotelian work *De plantis* from the Arabic of Nicholas of Damascus; the Greek original of this work is lost; Alfred also translated the pseudo-Aristotelian work *De vegetabilibus* (probably from the Arabic of Ishāq ibn Ḥunayn).

The thirteenth century was an age of ARABO-SCHOLASTIC REVIVAL, and one of the greatest epochs of human history; the impulse to this intellectual activity was derived in the main from the Arabic writers among whom the most prominent were Avicenna, Avenzoar, Averroës, and Albucasis. As already pointed out, Albertus Magnus and Roger Bacon, who were eminent types of the Arabo-Scholastic medical profession of the thirteenth century, derived the basis of their learning from Arabian sources.

Mediaeval Europe regarded Arabian Medicine with superstitious awe, and Cordova was looked upon with admiration by the educated European. This tendency led to Moslem Spain and Toledo, its intellectual outpost, being considered the source of 'Saracenic studies' which represented at that time the main source of the ancient Greek tradition. Those who succeeded in penetrating the barriers that separated the Christians of the West from the Græco-Arabic scholars of Spain, as Michael Scot, Adelard of Bath, and Gerbert, were usually regarded as the 'servants of Satan', though Gerbert the Frank,¹ who studied medicine and mathematics under Moslems in Northern Spain, taught later at Rheims, and finally became Pope Sylvester II.

The conquest of Toledo by Alphonso of Castile brought the Western scholars into more intimate contact with Arabian learning. The Arabian tendencies of Frederick Barbarossa and Frederick II of Sicily found an outlet for their Arabian learnings in the encouragement of the translating movement at Toledo,

¹ N. Bubnov, *Gerberti Opera Mathematica* (Berlin, 1899).

and employed Jewish scholars to translate the Arabic works that were available in Europe.

The foundation of the society of translators on or after the year A.D. 1130, by the archbishop Raymond, who held office at Toledo at that time, and its placing under the charge of Dominicus Gundisalvi, gave the great translating movement prominence, and in the year 1170, GERARD OF CREMONA (1114-87) went to Toledo it is said, at the command of Barbarossa, in order to translate the *Canon* of Avicenna. A student of his ability and gift for languages was soon able to overcome the difficulties of Arabic, of which he acquired a perfect knowledge under the tutorship of a native Christian writer, Ibn Ghalib.¹ Being armed with this powerful resource, Gerard was the first European to whom the doors of Arabian Medicine were really open. He translated into Latin some seventy Arabic works,² including Arabized versions of Hippocrates, Galen, Aristotle, and Ptolemy's *Almagest*,³ as well as the *Canon* of Avicenna (of which more anon), Serapion, Isaac Judaeus, Rhazes' *Liber ad Alman-sorem*, and the surgery of Albucasis. His translations were fully credited but, despite this, the versions of Constantine were used in Europe as authoritative long after Gerard had done his work. It will be noted that a large part of Gerard's translations were of works that were brought to the Western from the Eastern Caliphate. He died at Toledo⁴ at the age of 73, bequeathing his writings to the Monastery of St. Lucy where he was interred.

The translations of Gerard were for the most part made

¹ C. Singer in *Mediaeval Contributions to Modern Civilization*, p. 125.

² LeClerc furnishes us with a list of these. Appendix I of this work contains an alphabetically arranged list of the principal medical and philosophical works translated by Gerard.

³ This work was translated into Latin from a Greek MS. in 1160, by a medical student of Salerno (cf. Haskins and Lockwood, *Harvard Studies in Classical Philology*, 1910, xxv, pp. 75-102). This work was translated into German by Monitus (Leipzig, 1912).

⁴ Baas, *Outlines of the Hist. of Med.*, p. 285.

between 1170 and his death (1187). The order of translations of the principal medical works were :—

(1) Rhazes' 10 books of the *Liber ad Almansorem*.

(2) Albucasis' three Surgical Tracts.

(3) Avicenna's *Canon* of which Book iv, chaps. 4, 5, contain surgery.

It is probable that Gerard of Cremona did not complete the translation of the *Canon*, and that Gerard of Sabbionetta did so early in the next century ; this translation formed the basis of a large number of subsequent versions.

GERARD OF SABBIONETTA, who succeeded him, was also a great European translator associated with Toledo, and like his namesake of Cremona, worked strenuously in order to pass on the Arabic heritage to Latin Europe.¹ He is said to have undertaken the translation of the *Canon* by order of Frederick II of Sicily.

The MSS. of both the Gerards (over which there is some confusion) are : *Paris, Nat. Lib., MSS. Lat. 7400, 7421 ; MS. Suppl. Lat. 49 ; Rome, Vat. 4083, and Ottobon 1826 ; Oxford, Bodl. 47, 61.*

Among the other Latin translators of Arabic works at this time, may be mentioned MARCUS OF TOLEDO (c. 1200) who translated the following Galenic writings, *De tactu pulsus*, *De motu musculorum* (*membrorum*), *De utilitate*, *De motibus liquidis* (*lucidis, fluidis, difficilibus*), the *Isagoge ad Tegni Galeni* of Johannitius and Hippocrates' *De aëre, aquis*, etc. (MS. Vienna 1157, n. 2,328 b.).

DOMENICO GONZALES (OR GUNDISALVI) who was a native Christian, translated the *Physica* and the *De cælo et mundo* of Aristotle, and the *Sufficientia* of Avicenna (*Avicennæ Opera*, 1495, 1500, and 1508).

The converted Jew AVENDEATH, also known as JOHANNES HISPALENSIS and John of Seville and Toledo, whose principal

¹ C. Singer in *Mediaeval Contributions to Modern Civilization*, p. 127.

work was the translation of astronomical and astrological Arabic treatises, rendered into Latin the following *Epistola de conservatione corporis humani*, i.e., *secretum secretorum philosophorum* (a pseudo-Aristotelian treatise from the Arabic of Ja'hja ibn Batrik); this work, which was translated into Latin early in the twelfth century, speedily passed into most of the European vernaculars and was utilized in the compilation of 'chap-books' ¹ until the eighteenth century. The *Secretum* was a treatise on popular medicine, physiognomy, and alchemy, and discusses the elixir of life.² It exercised a great influence over Roger Bacon.³

The other works translated by Avendeath include Avicenna's *Sufficientia* (Arab. *Schafa*), *De anima VI naturalium*, *Metaphysica* or *Philosophia prima, sive scientia divina* (MS. Par. 6443), *De cælo et mundo*, Kosta ben Luka's *Differentia inter animam et spiritum*, al-Farabi's *De scientiis, sive lib. Gundisalvi de divisione philosophiæ*, Avencebrol's (Gabirol) *Fons vitæ*, al-Gazzali's three books on logic, metaphysics, and physic, al-Kindi's *De intellectu (et intellectu)*, and Thabit ben Kurra's *De imaginibus astronomicis*.

HERMAN THE GERMAN who is said to have been a teacher of Roger Bacon, visited Toledo between the years 1240 and 1256. His works have not been ascertained with any certainty, but he is credited with a Latin translation of Averroës' commentary on the rhetoric and poetry of Aristotle (1256), a book entitled in the Latin translation *Summa quorundam Alexandrinorum* (1243 or 1244), and al-Farabi's *Declaratio compendiosa . . . super libris Rhetoricorum Arist.* The time of Herman's translating activities coincides with the period when it was no longer necessary to visit Spain in order to secure the 'ancient learning'

¹ R. Steele, *The Mediaeval Panacea*, Proc. of the Royal Society of Medicine, 1916, vol. x, part ii, p. 94.

² Ibid., pp. 93-106. A full and interesting account of the elixir of life is given in the article referred to.

³ C. Singer in *Mediaeval Contributions to Modern Civilization*, p. 127.

that was held in great esteem in the Latin West. Following the conquest of Constantinople in A.D. 1204, the original Greek texts gradually began to drift to the West; the earlier Greek works that came westward were mainly the philosophical writings, for we find that by order of ROBERT GROSSETESTE who was bishop of Lincoln between the years 1240–44, a Latin translation of Aristotle's *Ethics* was made from the original Greek, while WILLIAM OF MOERBEKE (who is referred to as William the Fleming by Roger Bacon) produced Latin renderings of Aristotle's *Rhetoric* and *Politics*; these Latin renderings, though they established the principle that direct translation from the Greek was desirable, did not otherwise influence the tendency now fully established, of studying the translations made from the Arabic versions as found in the Moslem West, and translated at the college at Toledo.

The Sicilian centre was considerably less active than that of Spain, and with the death of the Jew FARRAGUT in 1285, who was of Sicilian origin and a student of Salerno, the great period of translation may be said to come to a close.¹ Farragut translated the pseudo-Galenic work *De medicinis expertis* from the Arabic of Hunayn, Rhazes' 'Continens', the *Tacuini ægritudinem* of Ibn Jazla, and the *Chirurgia* of pseudo-Mesuë.

The mass of these translations were catalogued and systematically studied by the scholastic physicians of Europe. The scholastics who attacked this mass of Arabic doctrine may be divided into four groups: commentators, aggregators (who extracted the best from their authors), conciliators (who attempted to reconcile the contradictions of Hellenists and Arabists by means of dialectics), and concordors (who arranged and harmonized the ideas and paragraphs of an author in regular order).

This period was marked by a distinct lack of independent thought. The influence of Constantine, the African, began to

¹ C. Singer in *Mediaeval Contributions to Modern Civilization*, p. 127.

express itself in the early thirteenth century, and was noticeable in the writings of the physicians Ricardus Anglicus, Gaultherus Agulinus, Petrus Hispanus, Gilbertus Anglicus, and Jean de St. Amand. The last-named wrote a work entitled *Revocatum memoriae* which was a condensation of Galen and Avicenna, and a work entitled *Areolæ* which was a *vade mecum* on *materia medica*.¹

THADEUS ALDEROTTI (1223–1303) presents us with a combination of Arabian erudition with the Greek spirit; he commented on the faulty translations of Constantine; Neuburger says that his skill in the subtleties of logic suggests a training in the *Canon* of Avicenna, and he introduced the practice of submerging the text in a swamp of commentary.

The Arabic works in translation exercised a great influence over the doctrines on astrology and medicine in Europe, and astrology became an important subject in the medical curriculum of the Middle Ages, and this influential position was maintained until the end of the Middle Ages of Science and Medicine (A.D. 1543).²

These Arabic works also reinforced and amplified the doctrine of the four elements which has already been described. This doctrine had been inherited by Christendom from the works of Aristotle, and held that all matter was made up of four essential elements—earth, water, fire, and air.

The belief that the zodiacal signs, planets, and the various parts of the human body had some direct relation and interaction between them, was conveyed to the Dark Age from the classical period (Firmicus Maternus c. 330, Avienus c. 380, and numerous Greek texts), but was lost until it was reintroduced to Latin Europe by the Arabs. The Arabic works greatly influenced mediaeval manuscripts, and these documents are very often

¹ F. H. Garrison, *An Introduction to the Hist. of Med.* (3rd ed., 1922), p. 153.

² The true mediaeval period in the history of medicine and the other sciences, begins about the middle of the twelfth century (Singer).

illustrated with diagrams of human figures showing the various human parts controlled by the various signs of the zodiac, and the relations of the viscera to the seven planets. These doctrines became interwoven with that of the macrocosm and microcosm, and later formed the basis of the scientific doctrines of the post-Arabian period.

The translators having completely won Arabic science and medicine by A.D. 1285 (i.e., the date of Farragut's death), the period of 'translation' comes to a close, and this is followed by the Scholastic Period when the Arabic teaching is transmuted first by the *mystics* and then by the *systematisers*.

The material¹ thus conveyed to the Latin West through the medium of the 'translators' caused a reawakening in the intellectual outlook, and these translations were, as already stated, systematized and commented on by the scholastics who appear to have had a great and unreasoning reverence for the Wisdom of Antiquity. A characteristic of the Latin Scholastic was that he sought to be encyclopædic and to elaborate a 'complete scheme of things', and with the varied material conveyed to him from the Arabians he elaborated a definite scheme which took into account both the physical and mystical aspects of events as they came within his mental horizon; the Mediaeval Scholastic, as Singer fully points out, was not a specialist. These early thinkers in the first post-Arabian Period (i.e. the Age of Mystics) included Hugh of St. Victor (1095-1141) who based his theories on drifting Arabian rumours, Bernard Sylvestris (c. 1156) who drew on Herman the Cripple, and Hildegard who relied on Sylvestris and other writings that showed Arabian influence in which the doctrines of the macrocosm and microcosm were mystically treated. These mystics drew no ultimate

¹ A careful study of the work of the Latin translators of the Arabic writings will be found in Appendix I of this work. The names have been alphabetically arranged, and the material is based on Steinschneider's *Die europäischen Übersetzungen aus dem Arabischen* (Vienna, 1905).

distinction between spiritual experiences and physical events, an attitude common to the mystics of all ages.

This 'Age of the Mystics' reached its culmination in the works of Dante (1265-1327); and by the thirteenth century we enter the second post-Arabian Period when Arabian Medicine and Science, having been won by the translators, was systematized by the transmuters, and dominated the mode of thought in Latin Europe.

CHAPTER IX

THE TRANSMUTERS AND THE ARABIST DOMINANCY IN LATIN EUROPE

The Period including the ninth to the twelfth century was devoted to a reconciliation of the claims of faith and reason, and during this period there was a close study of the different elements of which language was composed ; this resulted in wordy dialectics and endless disputations between two schools of thought who came to be known as Scotists (Nominalists) and Thomists (Realists). From the twelfth to the sixteenth century the introduction of Aristotelian writings, chiefly through Arabic sources, led to the further development of idle discussions, but also to mysticism and to the study of natural phenomena. It was the strife between Nominalism and Realism, combined with the steady advance of medicine and science generally, that brought about the downfall of mediaeval medical scholasticism. The mediaeval dialecticians credited all goals of human endeavour with inherent unity, and avowed specialism was foreign to the temper of the times.

The thirteenth century was pregnant with promises of a great intellectual revival, the Arabic culture that had been translated by the Latin scholars, e.g. Gerard of Cremona, Michael Scot, Gerard of Sabbionetta, Alfred the Englishman, and 'Farragut' aided by the work of the transmuters, e.g. Alexander of Halle, Aquinas, and Grosseteste, and supported by the efforts of the experimenters, e.g. Witelo, Adam Marsh, and Roger Bacon, all of which was backed by the development of the Universities of Paris, Bologna, Oxford, Montpellier, Cambridge, Padua, and Naples.

One of the effects of the Arabic influence on Europe was the large number of Universities in Spain after the fall of Cordova (1236); there were sixteen in Spain alone before the end of the fifteenth century, though some of them had no medical faculty and the Spaniards did not make any appreciable contribution to the spread of learning. The University of Seville was particularly devoted to the study of Arabic, and the geographical position of Spain led to it being called upon to transmit the culture of the Western Caliphate to Europe generally.

With the absorption of the Arabic learning astrology¹ became one of the principal themes of study, but another fundamental theory inherited from antiquity, and reinforced by the Arabic revival, was the doctrine of the four elements.² It was said that all matter was composed of four elements—earth, air, fire, and water, and that each of the elements was made up of four ‘primary qualities’, heat and cold, moistness and dryness, in binary combination; in this way water was cold and moist, earth cold and dry, air hot and moist, and fire hot and dry. Further, each element in the macrocosm had a corresponding element in the ‘humours’ in the microcosm, so that the elemental earth corresponded to ‘black bile’, elemental water to ‘phlegm’, elemental fire to ‘blood’. The doctrine of the macrocosm and microcosm was later developed by Dante (1265–1321) in his writings.

The earlier Latin writers, e.g. Firmicus Maternus (c. 330), Avienus (c. 380), discussed the relationship between the zodiacal signs, planets, and the different viscera of the human body.

¹ Lewis Spence in his *Myths and Legends of Babylonia and Assyria* (Harrap, London), 1916, ch. vii (Babylonian Star Worship), p. 231, writes: “Ancient Chaldea was undoubtedly the birthplace of that mysterious science of astrology which was destined to work such influence upon the European mind during the Middle Ages, and which indeed has not yet ceased to amuse the curious and flatter the hopes of the credulous.” C. Singer in *Mediaeval Contributions to Modern Civilization*, p. 132.

² *Ibid.*, pp. 132–6.

This belief gradually lost ground in the Middle Ages, until it was reintroduced with renewed strength by the Arabic Infiltration. It is common to find figures of the human body marked with the planets and the signs of the zodiac indicating the various parts of the body they were believed to exercise control over.¹ These illustrations are common in mediaeval manuscripts.

Thus it was that the conception of the macrocosm and microcosm got inextricably interwoven with the study of astrology.

All the Arabic medical writings had been translated into Latin,² and a knowledge of Greek began to be acquired. The scientific works of Aristotle became part of the curriculum of the Universities of Europe.

This vast collection of material had to be systematized in order to make it more readily accessible, and a school of teachers (the transmuters) arose, who systematically arranged the data transmuted in accordance with spiritual truth as they understood it. These teachers included Alexander of Halle (d. 1245), Grosseteste (d. 1255), St Thomas Aquinas (1225-74), Albertus Magnus—"the Christian Aristotle" (1193-1280), Roger Bacon (1214-94), Arnold of Villanova (1235-1320), and Peter of Abano (1250-1320); of these, two stand out as pre-eminent types of the Arabo-scholastic medicine of the thirteenth century, Arnold the alchemist of the new medicine, and Peter who, as Withington says,³ "represents the scholastic side of the new medicine with its love of subtle distinctions and wordy dialectics."

¹ Maimonides, who was a pupil of Averroës, in his commentary on the *Mishnah*, says that idolatry owes its origin to the belief that "*God hath created those stars to govern the world*" and therefore it was "meet that men should glorify and give them honour" (cited by Lewis Spence in his *Myths and Legends of Babylonia and Assyria* (London, 1916), ch. viii, pp. 232-3).

² LeClerc (in his *Histoire de la Médecine Arabe*, vol. ii, pp. 345-8) is of the opinion that the translations from the Greek into Arabic were generally effected with much greater skill and knowledge than the later translations from the Arabic into Latin; and that therefore a true conception of Arabic Medicine cannot be formed from the mediaeval Latin versions of the Arabic writings.

³ E. T. Withington, *Medical History*, p. 202.

A characteristic of the writers of this age was that although there was a considerable progress in the 'mental history of Europe', there is but little evidence of observation of the phenomena Nature. The *De vegetabilibus* of the scholastic Albertus Magnus shows, however, that the scientific spirit of Europe had not been extinguished by the prolonged twilight of the Dark Ages that supervened between the decay of Greek learning and the Renaissance. The encyclopædists, such as Alexander of Neckam (1157-1217), Vincent Beauvis (1190-1264), and Bartholomew Glanville (c. 1260), who transcribed from Constantine,¹ based their work largely on the commentaries of Averroës or Aristotle.

The thirteenth century saw three important events that materially affected the trend of medical history in Latin Europe. The first of these were the edicts (1224) of Frederick II in regard to the education and licensing of medical men in the south of Italy and Sicily; the second was the coming to a close of the Umayyad dynasty of the Western Caliphate which was centred in Cordova, and the converting of the *Mezquita* into a Christian cathedral in 1236; and the third was the fall of the 'Abbāsīd Caliphate of Baghdad in 1258, when the Mongols ('sons of Satan') overran the territory of the Eastern Caliphate, and left its culture a mere shadow of its past.² The percussion and repercussion of the last-named was not without its effect on the West, for the Christians of the Iberian Peninsula received great moral support by this event, and those of the rest of Europe were encouraged to further crusades which only came to an end in 1272, i.e. fourteen years after the sack of Baghdad.

¹ Freind, *Hist. of Physick*, pt. ii, p. 294.

² E. G. Browne (in his *Arabian Medicine*, p. 6) writes as follows: "'The hateful Mongols, that detestable nation of Satan' as old Matthew Paris (writing in A.D. 1240) calls them, who poured forth like devils from Tartarus, so that they are rightly called 'Tartar' did their work of devastation only too thoroughly, and the Muhammadan culture which survived the sack of Baghdad and the extermination of the Caliphate in A.D. 1258, was but a shadow of that which preceded it."

Following the debacle of Islam in Spain, the European scholastics who arose attempted to rescue the Arabic Literature of the Western Caliphate from the oblivion that they desired for the religion of the Arabs. Much of this literature was embodied in encyclopædias, and much of these were in "Latino-barbari". The Arabic medical literature that had reached the Latins of the West led to the rebirth of the medical system of Europe at about the middle of the twelfth¹ century when the true mediaeval period begins.

The Scholasticism of mediaeval times was in the main a direct outcome of the Arabic² revival in Europe; the expounders of mediaeval medicine drew on the Arabic material (in their Latin translations) thereby completely Arabizing the system of medicine in Europe. Medical literature in the strict sense was chiefly composed of writings explanatory of the works of the Ancients and the Arabic³ authors; and although the results did not correspond with the labour bestowed on this literature, the Middle Ages were not destitute of intellectual⁴ equipment and the life of the scholar was necessarily active both physically and mentally.

The manner in which the High Scholastics attacked the mass of Arabized Learning is well illustrated in the writings of William of Luna who lived in the beginning of the fourteenth century. William's translations include Averroës' *Comment. super lib. introductionem (?) Porphyrii*, which commences in his rendering *Intentio in hac dictione est explanatio est ejus*, while he begins his work on Aristotle's *Prædicamenta* with 'Intentio in hoc sermone est explanare ententias' (MS. Amplon. Qu. 318^{3, 4, 5} dated to the early fourteenth century). Steinschneider says that William based his work on the *De Anima* of Averroës.⁵

¹ C. Singer, "A Review of the Medical Literature of the Dark Ages, with a new text of about 1110," *Proc. of the R.S.M.*, 1917, vol. x, pt. ii, pp. 107-60.

² *Ibid.*, p. 109.

³ Puschmann, *Hist. of Med. Education*, p. 282.

⁴ *Ibid.*, p. 284.

⁵ *Die europäischen Übersetzungen aus dem Arabischen*, iv, p. 80.

JOHN OF ADERN (c. 1350), a British physician and surgeon who practised the healing art in London during the middle of the fourteenth century, wrote on both medicine and surgery, and was the first to revive the art of surgery in England.¹ John largely transcribed from the Arabians.²

The medical literature of the Arabs that reached the Latins of the West, led to the re-birth of the medical system of Europe at about the middle of the twelfth³ century when the true mediaeval period begins. Much of this literature was embodied in encyclopædias, and a notable feature of these compilations was the lack of direct observation of nature; they were built principally on the works of Aristotle as conveyed by the Arabic commentator Averroës.⁴ The Latin rendering of the Arabic works, which, as shown, were largely Greek writings rehabilitated in Arabic dress, was the source of learning that represented a faithful tradition of Ancient Wisdom,⁵ and appealed to the European scholastics, until the works of the 'experimenters', e.g. Witelo Adam Marsh, and Roger Bacon, gradually led to the first-hand investigation of phenomena which replaced the subtleties of Aristotelian logic (in their Arabic garb), and the modern period emerged. It was not until the first century after the discovery of printing⁶ that the work of the experimenters, supplemented by a direct knowledge of the Greek originals, led to the Arabian culture of the Western Caliphate falling into a state of exaggerated contempt.⁷

ALBERTUS MAGNUS (1190-1280), the great scholastic in his *De animalibus* and *De vegetabilibus*, marks the dawn of observation; the science of Albertus was based primarily on Aristotelian

¹ Freind, *The Hist. of Physick*, pt. ii, p. 325.

² *Ibid.*, p. 329.

³ C. Singer, *Proc. of the R.S.M.*, 1917, vol. x, pt. ii, pp. 107-60.

⁴ C. Singer in *Mediaeval Contributions to Modern Civilization*, p. 139.

⁵ E. G. Browne, *Arabian Medicine*, p. 2.

⁶ Gutenberg's printing press appeared in 1450.

⁷ E. G. Browne, *Arabian Medicine*, p. 3.

and pseudo-Aristotelian works translated from Arabic, but he does show considerable powers of observation, and his work is of value as it presents us with a *résumé* of the best scholastic point of view in Western Europe in the thirteenth century. He did not write on the practice of medicine, and the work *De secretis mulierum* has been erroneously ascribed to him.

Among the early experimenters was Witelo the Pole (c. 1250), who wrote a work on optics which was based on a translation of the Arab Alhazen ; he was an acute observer and had a knowledge of mathematics and knew the use of lenses.

The introduction of the scientific works of Aristotle through the medium of Arabic works in the thirteenth century led to a revival of science and learning generally. The new scientific movement began under the wing of the Western Caliphate and the great names associated with this movement are Avicenna (d. 1037), Algazel (d. 1111), and Averroës (d. 1198). Robert Steele¹ in his essay on 'Roger Bacon and the State of Science in the Thirteenth Century', says that their commentaries on the text of Aristotle represented the highest point of the battle between reason and faith, between the philosophers and theologians of Islam ; the battle spread from Islam to the Synagogue, and though the Mahomedan theologians finally crushed the school of Arabic Aristotelianism, its Jewish disciples carried on the tradition and played an important part in its transfer to the Christian community.

The universities were the main centres that influenced the trend of thought and the new Aristotelianism appeared possibly at first as summaries of the text with the commentaries of Avicenna and Algazel, and later the more or less complete versions of Aristotle himself and the works of *the commentator* Averroës. The first of these versions was of the logical works

¹ *Studies in the History and Method of Science*, ed. by Singer (Oxford Univ. Press), 2nd vol., 1921, p. 124.

and is dated c. 1150,¹ and was made in Toledo; the evidence seems in favour of the opinion that a nearly complete Aristotle was in the hands of Latin Europe by the end of the first quarter of the thirteenth century. Medicine and alchemy were at this time empirical arts.²

The 'Penitents of Assisi' (the Franciscans) whose learned development was contemporary with Witelo the Pole, produced some scholarly works on science and letters. Of this order was ROGER BACON (*Doctor mirabilis*), who began to take part in the scientific movement about the year 1235; there is no doubt that Bacon derived much of his knowledge and many of his theories from Grosseteste, but Bacon's early teaching of astronomy, as shown in the notes of his lectures preserved in the Amiens MS., suggest that his early studies were in the hands of teachers whose astronomy was derived from the pre-Arabic science.

In his medical work *Epistola de accidentibus senectutis* Bacon drew from the Arabic medical works; these included the writings of Avicenna, Rhazes, Isaac Judæus, and Janus Damascenus. After the writing of this work he began the study of Greek which was a spoken and written language in Southern Italy at this time. Bacon took an interest in magic and spiritual seances; he allowed a certain utility in charms in the hands of physicians quoting Avicenna as to the effect of the mind on the body; but he knew no Arabic.

Bacon's intellectual³ legacy was an important link in the chain of scientific development and his work was regarded as authoritative at Oxford in the fourteenth and fifteenth centuries. His influence is traceable through Pierre d'Ailly and the *Imago Mundi* to Colombus and through Paul of Middleburg (1445-1534) and the reform of the Gregorian Calendar to Copernicus.

¹ Ibid., p. 125.

² Ibid., p. 126.

³ A full account of Bacon's work on science is given in the *Commemorative Essays*, edited for the seventh centenary by A. G. Little (Oxford, 1914), with an account of his work in medicine by E. T. Withington.

Later in the century the University of Bologna became a great centre of medical education, and the scientific school which was founded there in 1260 is associated with the name of Thaddeus of Florence, and was founded on the teachings of Avicenna. At the end of the century in Bologna there was a close connexion between medicine and astrology, and judging from the names of the Bolognese scholars, e.g. Theodoric, William of Saliceto, and Roland of Parma, surgery was well taught. It was at Bologna that Theodoric (1206–98) worked. A revival of the art of surgery occurred under the mastership of Roland of Salerno: Roland had only Constantine among the Arabs to rely on. Anatomy at Bologna made an advancement under the ‘experimenter’ William of Saliceto (d. 1277), who fully expressed the native Italian renaissance of the thirteenth century in combination with Arabic learning, and practised anatomical dissections, thus breaking the first soil of modern anatomy. His practical methods were inherited by Mondino de Luzzi (Mundinus) (1276–1325), who wrote a work on anatomy (‘Anathomia’) about the year 1315; this work, which was an advancement on the fictive anatomy of the Arabians, became a recognized textbook on the subject in the later Middle Ages. There appears to be some doubt as to the date on which Mundinus of Bologna wrote his ‘Anathomia’, a work based on actual human dissection; the evidence points to the year 1315 or 1316, and not 1282, as mentioned by some writers; Mundinus was professor of anatomy at Bologna from 1306 to 1325.¹ MSS. of his ‘Anathomia’ are rare; it was first printed in 1478 (Pavia), and reprints appeared in the fifteenth and sixteenth centuries. At this point it is important to mention that the work of William of Saliceto supplanted that of Albucasis, but that like that of Mundinus was defaced by the Arabist nomenclature of those that followed.

¹ Further reference to the anatomical dissections of Mundinus will be made in the short review of the history of anatomy in the latter part of this chapter.

The SCHOOL OF MONTPELLIER was an Arabist centre in the Middle Ages : with Italy on one flank and Cordova on the other, it became rich in books, having obtained all Constantine's and Gerard's translations, and this at a time when the medical library of Paris was limited to under a score.

A famous Arabist pupil of Montpellier was RAYMOND LULL or LULLI (1235-1312) : he went to Africa as a medical missionary, and was an early representative of the Arabists at Montpellier. Among the most prominent of the alumni of Montpellier was ARNOLD of VILLANOVA (1235-1312) the alchemist of Arabo-scholastic medicine, who was a typical Arabist of the Middle Ages. Villanova was acquainted with Lulli and refers to him as 'master'.¹ His principal source was Avenzoar (the great clinician of the Western Caliphate). While in Spain he studied the Arabic authors and wrote on medicine and chemistry. He was also a profound devotee of astrology,² the knowledge of which he derived from Raymond Lulli.³

He knew the three learned languages of his day, i.e. Arabic, Greek, and Hebrew, and enjoyed a great reputation as a man of letters, and as a practising physician his Arabist leanings and his personal reputation were not without their effect on the trend of medical thought of his day ; his followers came to be known as the "Arnoldistæ".⁴ Of the first hundred medical works printed a large number were associated with the name of Arnold. He pointed out the value of alcohol in extracting the essences of herbs, and described a number of chemical medicines, e.g. 'Aqua Mirabilis' and 'Aqua Euphrasiæ', thus justifying the statement that he was the alchemist of Arabo-scholastic medicine.

¹ Freind, *Hist. of Physick*, pt. ii, p. 254.

² Bass, *Outlines*, p. 268.

³ Robley Dunglison, *Hist. of Med.*, ed. R. J. Dunglison (Philadelphia, 1872), p. 215.

⁴ Freind, *Hist. of Physick*, p. 253.

In his commentary on the *Regimen Sanitatis* he adopted the chemical innovations of the Arabs, while sustaining the best traditions of the School of Salerno with the latter's predilection for dietetics and hygiene. The wave of Arabist influence can be traced through Arnold's treatises. He was an exponent of Hippocratic methods and advised the taking of clinical notes.

The *Opera Omnia* of Arnaldus de Villanova was published in Lyons in 1532. The work *Breviarium Practicæ* has been ascribed to Arnold, though the writer mentions Naples as his place of education. The third book of this work begins in the following curious manner: "In this book I propose, with God's help, to consider diseases peculiar to women, and, since women are for the most part poisonous creatures, I shall then proceed to treat of the bites of venomous beasts." The *Breviarium Practicæ*, and be it noted most of the Arabist books were included under the generic term of *Practicæ*, rose far above the rank of the voluminous compilations that characterized the medical literature of the Scholastic Period. At the time of Arnold the practice of medicine was largely in the hands of the clergy.

As Arnold was the great representative alchemist of Arabo-scholastic medicine of the thirteenth century, so PETER THE HERETIC (1253-1316) of Abano represents the scholastic side of the new medicine. His name is associated with the school of Padua. Peter's outlook was more modern than that of Arnold, and like the latter his views collided with those of the priesthood of the day. Peter understood Greek and was influenced by Averroës, and accepted the doctrine of the universe; his astrological doctrines allowed of no room for the action of Providence, and he denied the existence of the Devil. Thomas, general of the Augustinians, says that he was present when Peter's bones were burnt in Padua for these and other heresies. Peter's great work was the *Conciliator Differentiarum*, a work

in which, as Singer says, he expressed the mediation between the now commencing humanistic Greek school and the Arabists. This work was first published in Venice in 1471. Of the 182 medical works printed before A.D. 1481, eight were written by Peter: the earlier editions of his texts are beautiful works. Peter translated the Arabic version of the Hippocratic work *Astrologia* into Latin, and must therefore also be placed among the Latin translators of mediaeval times. Withington describes him as "the earliest ornament of the University of Padua".

The biographies of Arnold and Peter would suggest a more strained relation between Medicine and the Church than was actually the case. But in fact the thirteenth century was marked by a partial truce between the two, and during this period they were intimately connected: POPE JOHN, who died in 1277 (the same year as Saliceto) is credited with the authorship of the most popular medical receipt book *Thesaurus Pauperum*,¹ while the surgeon Theodoric of Bologna (d. 1298) became a bishop.

The work of MATTHÆUS SYLVATICUS (d. 1342) of Matua, was similar to that of Peter of Abano, in that he attempted to reconcile² the views of Hellenists and Arabists: In his *Liber Pandectæ Medicinæ* he produced a dictionary of Greek and Arabic medical terms, and like his immediate successors, he used a sort of *lingua franca* which was almost unintelligible.

Other prominent members of the Arabist school of Montpellier include the leading representatives of Anglo-Norman medicine, Bernard de Gordon (? a Scot),³ Richard of Wendover, Gilbert the Englishman, and John of Gaddesden, as well as the leading exponents of Arabo-scholastic surgery, Guy de Chauillac

¹ Published in Frankfort in 1576, this work has been ascribed to the Pope's father, to Arnold of Villanova, to Albertus Magnus, and to Gilbert the Englishman.

² Baas, *Outlines*, p. 287.

³ *Ibid.*, p. 267.

the restorer of surgery' and Henry de Mondeville (or Hermondeville).

BERNARD DE GORDON (a Scottish professor) taught at Montpellier from 1285 to 1297, and wrote the *Lilium Medicinæ* which he began in 1305 and is said to have completed in 1307; this was a characteristic Arabist textbook on the practice of medicine and typical of the scholastic subtlety and rigid adherence to dogma that was the mental attitude of the Middle Ages; it was translated into French, Hebrew, and Gaelic,¹ and printed in several editions; in this work Bernard gives a description of a truss that corresponds to the standard truss of to-day, and he was the first medical writer to mention 'spectacles' and 'trochiscus'. His² other works include *De Phlebotomia*, *De Urinis*, *De Pulsibus*, and *De Regimine Sanitatis*. Fabricius,³ who was a teacher of William Harvey (1578-1657), regards these as parts of the *Lilium Medicinæ*.

GILBERTUS ANGLICUS (c. 1290), who though not the first English writer on practical medicine, certainly is among the earliest whose writings have been preserved to us. He wrote the *Compendium Medicinæ* or *Laura Anglica* (c. 1290), a work very like Bernard's *Lily*. Gilbert was a decided Arabist, and had a leaning for the works of Constantine, Avicenna, and Isaac Judæus. Gilbert was largely quoted from by Pope John in his *Thesaurus Pauperum* which, as stated, was a popular work in the Latin West: his surgery coincides with that of Roger of Parma. Gilbert quotes Averroës, and takes the bulk of his writings from the Arabians, often transcribing whole chapters of Rhazes.⁴ Gilbert mentions the chemical process

¹ The Gaelic translation and commentary of Bernard's *Lily* was known as *The Book of Healers*, and the MSS. are at Edinburgh.

² H. I. Bull's paper on 'The Bibliography of Bernard de Gordon's "*De conservatione vitæ humani*"', xvii Internat. Congress of Medicine, London, 1913, *History of Medicine*, p. 325.

³ *Ibid.*, p. 326, and footnote i.

⁴ Freind, *Hist. of Physick*, pt. ii, pp. 268, 269, and footnote a.

of sublimation and distillation,¹ and also the use of red light in the treatment of smallpox.

JOHN OF GADDESSEN (c. 1280–1361) was a Fellow of Merton College, Oxford, and compiled the famous treatise *Rosa Anglica* while at Oxford between the years 1305–17; in this work he quotes from the Arabists Bernard de Gordon and Henry de Mondeville. Guy de Chauliac, writing some fifty-six years later, describes the work as ‘scentless’ and states he found in it “the fables of Hispanus (Pope John), Gilbert, and Theodoric”. The popularity of this Arabist work is said to be due to its culinary and sexual contents. It was published at Pavia in 1492, 1517, Venice in 1502 and at Augsburg in 1595. In common with Gilbertus Anglicus and Bernard de Gordon he was acquainted with the use of red hangings in the treatment of smallpox, a procedure that was known to the early Japanese long before the time of John Gaddesden and the other Anglo-Norman physicians.² He is said to be the original of Chaucer’s *Doctor of Physick*, regarding which I shall have more to say later.

The medical writings of the thirteenth and fourteenth centuries consisted of compilations, commentaries, and concordances, the great mass of which were based on the Latin translations of the Arabic works that were available at Toledo in Spain. By this time the medical system of Europe had become a hopeless confusion of Arabic superstitions, ignorance, and bigotry. Clinical medicine advanced, however, and clinical records were ordinarily kept. The custom of keeping records can be traced back through Guy de Chauliac (d. 1368) and Arnold of Villanova (d. 1312) to Avenzoar (d. 1162) of the Western Caliphate. The first mediaeval ‘reports of cases’ were published in the thirteenth and fourteenth centuries and are in the main

¹ Ibid., p. 251.

² F. H. Garrison, *An Introduction to the Hist. of Med.*, pp. 70, 156, and footnote i.

unintelligible; the collections of those published include the 'Consilia' of Gentilis Fulgineus (before 1348), Bartholomew Montagnana (d. 1470), and Baverius de Baveriis of Imola (c. 1450); this custom of keeping 'consilia' was kept up to the time of John Lange (1554) and Locke, who sent reports of medical cases to Sydenham (1624-89). The most of these case books or 'consilia', says Sudhoff, "sleep in the manuscripts."

The SCHOOL OF PADUA followed the Averroism of Peter of Abano (to whom reference has already been made), and numbers among its pupils FRANCIS OF PIEDMONT (c. 1330), whose *Supplementum Mesuæ* which contains a collection out of the Arabians, was, says Garrison, the best textbook of the time on pathology and therapeutics and expressed the final union of Salernitan and Arabic Medicine, while NICHOLAS OF FLORENCE (d. c. 1412) gave a summary of the whole of mediaeval medicine in his *Sermones medicinales*, a work richly garnished with citations from all the Arabian authors.

At this time the School of Montpellier numbered among its members GUY and JACQUES DESPARS (Jacobus de Partibus) of Paris, the latter of whom wrote a commentary of Avicenna, Mesuë, and Alexander of Tralles: there appears to be some uncertainty as to the identity of these writers.

SIMON DE CORDO (d. 1330) wrote *Synonyma medicinæ*, the first dictionary of drugs and simples showing their Greek, Latin, and Arabic synonyms. JACOB DE DONDI (1298-1359) also wrote a similar work (*Aggregator de medicinis simplicibus*) in which he makes free use of the Arabic terms, and this work in conjunction with the *Synonyma medicinæ* of de Cordo and the *Liber Pandectæ Medicinæ* of Matthew Sylvaticus, were the agents through which the Arabic medical nomenclature were widely spread through Latin Europe.

This brings us to the end of the period when Arabic erudition was being grafted on to Latin Medicine, and we are at the commencement of the High Scholastic period that preceded

the Renaissance. This pre-Renaissance period was one during which Arabic teaching assumed a dominant position in Europe. An attempt was made to shape the Arabist tradition into a rigid mould by means of Aristotelian dialectics, with the result that the doctrines of Galen which had passed through Syrian, Arabic, and Hebrew translations, became hopelessly distorted.

Averroës' *Kitab-al-Kullyyat*, a work representing Arabic thought in the twelfth century, was a system of medicine based on the scientific writings of Aristotle. This work exercised a great influence over the trend of medical thought in the Latin Middle Ages, reinforcing the doctrine of the 'four elements' and the ideas of the macrocosm and microcosm that were widely held in Europe during the Dark Age. The influence of Averroës was the great interest taken in astrology among the High Scholastics.

Among the Arabic writers of the Western Caliphate, whose influence was far-reaching in the Latin West, were Albucasis and Avenzoar. Their writings have been discussed elsewhere in this volume, and it remains to be pointed out that Albucasis was responsible for the retardation in the development of surgical practice owing to his surgical tracts forming the basis of surgery in Christendom. The Latin translation of the surgery of Albucasis (by Gerard of Cremona) formed the standard surgical work, until it was gradually replaced by the work of Saliceto. Latin versions of his surgical work were, however, published at Basle and Venice during the fifteenth and first part of the sixteenth century, while (as noticed elsewhere) Channing published the Arabic text and Latin translation at Oxford in 1778.

Although the anatomy of Albucasis was based on that of Galen and his surgery on that of Paul of Ægina, he attempted to remove the treatment of fractures and dislocations from the care of "men of vulgar and uncultivated minds"; surgery at this time in Western Europe had apparently become the especial

perquisite of the quack and travelling mountebank. Albucasis was a great advocate of the actual cautery (a characteristic of Arabic medicine) and in book i of his surgery he is eloquent over the virtues of 'fire'. The result of his teaching on Latin Europe was that European surgery was retarded in its natural growth and development, and the Arabized versions of Galen took the place of actual human dissections. The Arabist method of teaching anatomy was by means of lectures based on Galen's doctrines, while anatomical dissections were not considered necessary to the aspiring medical scholars.

Avenzoar, the greatest thinker of Islam, on the other hand, was one of the few of his day who opposed the doctrines of Galen; he thereby represents the anti-Galenic school of the Western Caliphate. That he was a surgeon of some ability may be assumed from his descriptions of operations for renal calculus and that of tracheotomy. He was also a pathologist and a practical physician. He has also the distinction of having been the tutor of Averroës ('The Commentator of Aristotle') who in his turn taught Maimonides, and indirectly through the medium of Latin versions exercised a great influence over the Latin scholastics; he, as already stated, was the main source of Arnold of Villanova.

Avenzoar's opposition to the doctrines of Galen afforded the European Scholastics great moral support in their endeavour to gradually rebuild the science of anatomy "from the beginning" and this some of them were able to do without entirely breaking away from the dominancy of the Arabist tradition that they had inherited.

From the twelfth century onwards until the seventeenth century the works of Rhazes, Avicenna, Albucasis, Avenzoar, and Averroës received more attention than those of Hippocrates and Galen, while Serapion and Mesuë became the foundation of the New Pharmacy; this meant that the great body of the Greek medical works were read in Western Europe chiefly

through the Arabized versions of the Eastern and Western Caliphates.

The scholastics were masters of the then known 'world of learning' until courageous scholars began to be sceptical, thus preparing the ground for the revival of learning and the seeking of truth from Nature herself. The Black Death, among other causes in the second half of the fourteenth century, led to some stagnation in the intellectual currents in Western Europe.

In this century lived GUY DE CHAULIAC (1300-68), the greatest mediaeval surgeon of his age: his scholarship won him the laurels of the most eminent practitioner among the medical fraternity of his time. Guy, who was the most famous pupil of the Arabist Hermondeville, learned his anatomy from Nicholas who was a pupil of Mundinus, and inherited the learning of Arnold of Villanova (who obtained much of his clinical ideas from the practical physician Avenzoar); he also drew on the *Lilium Medicinæ* of Bernard de Gordon of the Arabist school of Montpellier. Guy, however, eliminated much of their astrology and mysticism.¹ He was greatly influenced by a Latin translation of Galen's *De usu partium* by Nicholas of Reggio. Guy's *Inventarium* or *Chirurgia Magna*, which was written in 1363,² was a popular and important surgical *vade mecum* even beyond the sixteenth century; this work contains a complete treatise on anatomy and chapters on materia medica and therapeutics. In this surgical work he freely refers to the Arabians Rhazes, Avicenna, and Albucasis. By supporting the anatomical doctrines of Galen and Albucasis and by recommending meddling Arabist methods in the treatment of wounds, he retarded the advance of surgery and, as the late Sir William Osler put it, the 'hand of the Arab' is decipherable in the work of Guy de

¹ T. Clifford Allbutt, *The Historical Relations of Med. and Surg.*, p. 45.

² Op. cit. Was first published in French translation at Lyons in 1478. A Latin text was first printed at Venice in 1490. An excellent modern edition is that of E. Nicaise (Paris, 1890).

Chauliac. The adherence of Guy to Galenism and 'coction' hindered for centuries the advancing tendencies of Theodoric (with his healing of wounds by first intention). His *Inventarium* which is representative of medical science during the High Scholastic Period, became the surgical code of Christendom and was translated into many European languages. Allbutt¹ says that this work may be regarded as the foundation of modern surgical doctrine of Western Europe. Guy does not mention Celsus.

Of the MSS.² four contain diagrams of surgical instruments. These are :—

Bristol MS. (City Reference Library).

MS. Française 184 Montpellier (fourteenth century).

Bibliothèque Nationale MS. Latin 17846 (written in 1472), and MS. Latin 6910 (second half fifteenth century).

Fourteen printed editions were issued in the fifteenth, and thirty-eight in the sixteenth, while further editions were issued in the seventeenth century, thus indicating the influence of Arabist teaching in the Latin West. The Surgery of the Arabo-scholastic Revival, which was based in the main on the Arabized Galen and the surgical tracts of Albucasis, found its most eminent exponent in Guy. Until the time of Avicenna, writes Guy,³ Medicine and Surgery were united but the latter had since degenerated as it had fallen into the hands of mechanics; regarding the European surgeons who showed Arabist tendencies, he says, "The earliest of these were Roger, Roland, and the 'four Masters' who wrote special books on surgery in which they mixed up much empiricism. Later came Bruno who combined cleverly enough the theories of Galen and Avicenna

¹ *The Historical Relations of Med. and Surg.*, p. 37.

² For a full account of the Bristol MS. of Guy de Chauliac, see Singer's article in the *Proc. of the Royal Society of Medicine*, 1917, vol. x, pt. ii.

³ Cited by E. T. Withington in his *Medical History*, pp. 207-8.

with the practice of Albucasis, but he had no complete translation of Galen and he entirely omitted anatomy. Then came Theodoric, ~~who compiled a book by stealing everything~~ Bruno had said with some of the fables of his master Hugh of Lucca. William of Saliceto was a man of ability: he composed two epitomes of physic and surgery, and in my opinion treated those subjects tolerably well, so far as he went. Lanfranc also wrote a book containing little else than what he got from William, but he changed the order. At the same time Magister Arnaldus de Villanova flourished in both faculties and wrote many excellent books."

Guy's commentary on the 'Arabic Infiltration' up to his time would show that although the surgery of Albucasis for a time gave way to that of William of Saliceto in Italy, it was "restored" to a dominant position as a result of the teaching of Guy. Guy's references to the Salernitan school show that the influence of Constantine was deeply impressed on Salernitan surgery.

The surgical ¹ tracts of Albucasis were based on the sixth book of Paul of Ægina, which in turn was based on Celsus and Galen, and these interpretations of Albucasis very materially handed on a body of surgical doctrine of Lanfranc, Saliceto, Henry de Mondeville, and Guy de Chauliac.

Guy's scholarship and surgical skill greatly assisted in maintaining the Arabist polypharmacy and salve-surgery in a position of dominancy in the medical system of the later Middle Ages. During the fifteenth and sixteenth centuries fifty-two editions of Guy's surgery were printed.² The surgical works of Roger, Roland, Bruno, Theodoric, Saliceto, and Lanfranc, together with those of Guy were published as the *Ars Chirurgica* in Venice in 1546.

The eminent Paduan professor LEONARDO DA BERTAPAGLIA

¹ T. Clifford Allbutt, *The Historical Relations of Med. and Surg.*, p. 44.

² *Ibid.*, p. 52.

(d. c. 1460) in his *Chirurgia*, presents us with an arrangement of book iv of Avicenna's *Canon* and an array of Arabic poly-pharmacy and salve-surgery with strong leanings towards astrology based on the *Kullyyat* of Averroës. Leonardo, who was not original in the work just mentioned, is known to have practised lissections. Anatomy at this time was studied by medical men and artists, e.g. Leonardo da Vinci.

Prior to the period of 'Arabic Infiltration', and particularly between the years 800 and 1200 (i.e. the Salernitan Period), anatomy was based on the structure of the hog, and porcine dissections were practised. The thirteenth and fourteenth centuries saw the Arabist medical teaching securely grafted on the medicine of Europe. Mundinus, who was a teacher of originality at Bologna in the year 1315, gave a series of anatomical demonstrations and dissected the human body: in the following year he dissected a female body. This father of modern anatomy has been accused of copying Galen, but it is certain that the Arabists who were dominant after his time corrupted his descriptions of the bodily parts, and defaced his Latin with the nomenclature¹ of Avicenna and Rhazes. And thus it was that though among his advances his anatomy of the heart was remarkably accurate and contained the rudiments of the circulation of the blood, the work of Mundinus made very little improvement in the anatomical outlook of the medical scholastics, with the result that surgery was held from further advancement. This was contributed to by the fact that the scholastics did not look favourably on the manual art of surgery.

It was not until the time of Guy de Chauliac (d. 1368), the most famous pupil of Hermondeville (Henry de Mondeville),

¹ The Arabic nomenclature of the European Arabists included the following mediæval Arabic terms: nape of neck, *nucha*, cesophagus, *meri*, umbilical region, *sumen* or *sumac*, abdomen, *myrach*, peritonium, *siphac*, and omentum, *zirbus*.

that the precision made possible by the anatomical research of Mundinus was once more seen.

Hermondeville, a typical mediaeval surgeon,¹ was a contemporary of Lanfranc of Milan who was a pupil of Saliceto and migrated to Paris some eighteen years after the foundation of a college of surgeons there by Pitard (1279). The colleges of surgeons in London and at Edinburgh were modelled on that at Paris.

Surgery in Spain at this time enjoyed a better repute, for the medical practitioners of Saragossa were granted the title of Medico-Surgeons, an arrangement that remained in force until the end of the sixteenth century.²

Internal Medicine was "essentially scholastic and monastic" and the medical scholastics accepted the entire body of Galenic and Aristotelian doctrine as transmuted by the Arabic writers, among whom Avicenna, Albucasis, Avenzoar, and Averroës were both typical and prominent: while Surgery was based on Galen and Albucasis and continued so up to as late as the middle of the seventeenth century, i.e. the time of William Harvey (1578-1657).

¹ Hermondeville's writings show a decided Arabist tendency. His *Anatomy and Surgery* have been edited by Pajel (Berlin 1889-92), and a French edition by Nicaise appeared in Paris in 1893.

² Puschmann, *Hist. of Med. Education*, p. 270.

CHAPTER X

THE EXPERIMENTERS AND THE EFFECT OF THEIR WORK ON ARABIST TRADITION IN EUROPE

In the preceding chapters we have traced the growth and development of the Arabist tradition in Europe. This Eastern learning essentially meant the relegation of experiment and observation to the background, while wordy dialectics and an unreasoning reverence for the doctrines of the Ancients (Galen and Aristotle in particular) were given a position of prominence. The writings of the earlier experimenters, such as Saliceto and Mundinus, were coloured with the Arabism which was dominant in their day, and it was not until the mantle of these early forward-looking workers had been taken up by those who followed, and the spark of the spirit of inquiry kept alive until we arrive at the dawn of the modern period and the publication of the fundamentally modern works of Vesalius and Copernicus in A.D. 1543, that the experimenters of Mediaeval Times finally vanquished the Arabist Tradition in the Latin West.

At the height of the Arabic domination of the intellectual world of Western Europe, there began to germinate the idea of appealing to Nature direct for her secrets, a process that needed both moral and physical courage. Certain Greek works, such as those of Hippocrates and Galen, had been translated into Latin directly from their Greek sources, but both the Hellenists and Arabists obdurately clung to the ancient teaching while the experimenters, whose gaze was forward, were breaking fresh ground.

The thirteenth century was a period of unrest and the criticism

of established authority and also one in which we arrive at the firm grafting of the Arabist tradition in the West. With these events there arose the early experimenters, Witelo, Adam Marsh, Roger Bacon, John Pecham, William of Saliceto, and Theodoric of Bologna; in the fourteenth, when the Latin West was thoroughly Arabized, there were Arnold of Villanova, Mundinus, Peter of Abano, Levi ben Gerson, and Guy de Chauliac; in the fifteenth were Nicholas of Cusa, Regiomontanus, Pomponazzi, Leonardo da Bertapaglia, and da Vinci (the painter of the famous picture 'The Last Supper'); in the sixteenth, with the final recovery of the Greek texts, we find the great controversy between the Hellenists and Arabists, and the great experimenters Paracelsus (d. 1541), Copernicus (d. 1543), and Vesalius (d. 1564), all three of whom were medical men. The efforts of these experimenters were supplemented, among others, by those of Achillini of Bologna (d. 1512) who was distinguished for his study of the anatomy of the brain, Berenger of Carpi (d. 1530), Fallopius (1523-62), Eustachius (c. 1500-74), Michael Servetus (1511-53) who accurately described the pulmonary circulation, Nicolaus Massa (d. 1569), Ingrassias (1510-80), who recognized the pathological distinction between smallpox and measles, Arantius (1537-1619), Varolius (1543-75), Fabricius of Acquapendente (d. 1619), and William Harvey (1578-1657), a pupil of Fabricius. With the seventeenth century we arrive at the period when the Arabist anatomical doctrines as based on Galen, and similarly those of the Hellenists, ceased to be accepted in Europe, owing to the foundation of experimental work laid by this succession of intrepid workers, whose difficulties were not a little enhanced by the orthodoxy and superstition they laboured amidst. The testing of ideas by experiment and observation, without regard to Arabist tradition and prejudices, was begun in anatomy by Vesalius, and in physiology by Harvey, while John Hunter was the first to study diseases in the living body.

The early experimenters may be divided into groups, the first of which was constituted by Witelo the Pole, John Pecham, and Roger Bacon ; these three applied themselves to the study of optics between the years 1266 and 1279. The study of this subject had up to this period been based on the optical treatise of the Arabian Alhazen (d. 1038). Roger Bacon (d. 1294) was a pupil of Adam Marsh (d. 1259) ; his experimental works having been described in the preceding chapters, we would repeat here, that he derived a great deal from Arabist sources and indirectly from the Arabist Robert Grosseteste in particular. He forms an important link through the *Imago Mundi* and the reform of the Gregorian Calendar, with Copernicus, the founder of modern astronomy. It was not until the time of Borelli (1608-79), however, that the application of mathematical and optical principles to the explanation of animal functions and to ophthalmology was conceived, though the Arab Alhazen showed some centuries earlier that light falls on the retina in the same manner as it falls on a surface in a darkened room through a small aperture.

Bacon's experimental work which was accepted as authoritative in Oxford in the fourteenth and fifteenth centuries was, judging from his published works, mainly confined to natural science as differing from the science of medicine, for his medical work, the *Epistola de accidentibus senectutis*, is but a collection from the writings of Avicenna, Rhazes, Isaac Judaeus, and Janus Damascenus, and shows an interest in charms, magic, and seances, thus corresponding closely with Chaucer's *Doctor of Physick*.

With Albertus Magnus (d. 1280), the 'Christian Aristotle' who showed great powers of observation, Roger Bacon the scientist, and the anatomist Saliceto, all of whom lived in the early part of the second half of the thirteenth century, we see the new dawn of philosophy, natural science, and medicine (anatomy). The translation of the Greek originals direct into Latin in the

thirteenth century had very little appreciable effect on the mode of thought among the scholastics, who looked to the monumental records of antiquity for their authority. Early in the fourteenth century, Nicholas of Reggio translated Galen "On the uses of the (bodily) parts"; the appearance of this Latin translation coincided with a revival of interest in dissections, and it was translated into a number of European languages, many MSS. of which survive.

The mantle of Saliceto (d. 1277), the pioneer anatomist of the Middle Ages, was inherited by Mundinus of Bologna (d. 1325); both these dissected the *cadaver* and wrote original works on anatomy. The writings of these two European anatomists who broke the first soil of modern anatomy were defaced by the Arabist nomenclature of those who followed. Guy de Chauliac (d. 1368), while adopting the innovations of Saliceto and Mundinus, made free use of the anatomical nomenclature of Rhazes and Avicenna, and his writings show the frequent occurrence of such mediaeval Arabic terms as *meri*, *sumen*, or *sumac*, *myrach*, *siphac*, and *zirbus*. Guy has been surnamed 'The Restorer' because of his having introduced the use of Arabic terms and doctrines with increased vigour into the European medical system of thought. That Guy's Surgery successfully restored Arabist methods and modes of thought to the Latin West, despite the original work of Saliceto and Mundinus, is clearly evidenced by the fact that fifty-two editions of his work were printed in Europe during the fifteenth and sixteenth centuries. During this period, however, the Italian school of anatomists, first at Bologna and later at Padua, continued their experimental work amid the sea of Galenic superstitions in which Europe was steeped. The fourteenth century was characterized by the Arabist tradition assuming a dominant position in Europe, though this period produced the early sceptics Peter of Abano and Levi ben Gerson, while Guy de Chauliac discarded much of Arabic astrology.

The fifteenth century, which was signalled by the rediscovery of the *De medicina* of Celsus and other classical writings, brought to light 'the reformers before the Reformation', among whom Nicholas of Cusa (1401-64) anticipated Copernicus regarding the theory that the earth moved round the sun, and freely expressed his suspicions of the authenticity of the *Epistolæ decretales*, at a time when orthodoxy and scholasticism reigned supreme.

The final breakdown of scholasticism, the bulwarks of which were the Arabian writings, begins with Nicholas of Cusa, whose teaching in combination with that of Copernicus in the next century greatly influenced Weigel, Andreas Osiander, Schwenkfeld, Franck, and later Jacob Boehme the father of modern theosophy in Germany. With the experimenters can be traced the scepticism and speculation that marked the transition from scholasticism to modern times.

JOHANNES MÜLLER or REGIOMONTANUS (1436-76) who was not contented with the Arabist versions of Ptolemy's *Almagest*, travelled in Italy in search of authentic MSS. He is credited with the first almanac of importance which was probably published at Nuremberg in 1472. These early almanacs, it is of interest to narrate, contained symbolical figures and prognostications, and these ideas were inherited by Francis Moore (1657-1715), who wrote the famous *Vox Stellarum*, which pretended to predict the events of 1701; this work is the parent of "Old Moore's Almanac" of to-day.

The other experiments of Regiomontanus included mechanical flying machines and certain mathematical problems connected with 'maxima and minima'.

Another great experimenter of the fifteenth century was POMPONAZZI (1462-1525) who was a doctor of medicine of Padua. His *De immortalitate animi* gave rise to a great controversy between the Catholic Thomists, the Averroists, and the so-called Alexandrists. The revolt of Pomponazzi heralded the Renaissance.

Anatomical dissections were practised in the latter part of the fifteenth century by LEONARDO DA BERTAPAGLIA (d. 1460) and LEONARDO DA VINCI (d. 1519); both these were acquainted with Avicenna and Galen. The former who is not original in his *Chirurgia* makes free use of the fourth book of Avicenna's *Canon*, while the latter, the greater part of whose anatomico-physiological MSS. are preserved at Windsor, was conversant with the anatomical writings of Galen, Avicenna, Mundinus, and Benedetti, and used the mediaeval Arabic terms *meri* for œsophagus, *siphac* for peritonium, and *myrach* for abdomen. Thus, it is evident that at this time the anatomical experimenters had inherited both the methods of the earlier European anatomists and the nomenclature of the Arabists. Da Vinci, however, despite his Arabic nomenclature did not hold the Arabist tradition in high esteem; he says: "They scorn me who am a discoverer; yet how much more do they deserve censure who have never found out anything, but recite and blazon forth other people's works. . . . Those who study old authors and not the works of Nature are the step-sons, not the sons of Nature, who is mother of all good authors." (Cf. Oswald Siren's *Leonardo da Vinci*, Stockholm, 1911.) Da Vinci did not publish his works.

The next great figure in chronological order was PARACELSUS (d. 1541), who publicly burned the *Canon* of Avicenna, and placed the science of medicine on a scientific foundation by his original work in applied chemistry in its relation to medicine. It is strange to relate that he scorned anatomy; his attitude to the subject was probably due to the fact that he had a great contempt for the Arabists, while on the other hand Vesalius had yet to publish his great anatomical work. The anatomical writings up to his time showed distinct traces of the Arabist tradition. Paracelsus is said to be the first to have employed laudanum and antimony in medical practice, and his teaching led to the formation of a school of experimenters who came to be called 'Paracelsic physicians'.

The next great figure was the anatomist NICOLAS COPERNICUS (1473–1543). Though it is not intended to attempt detailed biographies of those identified with the course of the new movement, but rather to trace the course of its development and its relation with the Arabist tradition, a few details of the training and travels of this physician-astronomer are essential to enable us to envisage the great tendencies of the later Middle Ages.

In the year 1496 Copernicus repaired to Bologna, and between the years 1501 and 1505 he studied medicine at Padua. On his return to Poland he practised medicine among the rich and poor with great success. He devoted much time and thought to astronomy, for his early training in Italy had laid the foundation for his subsequent epoch-making work. Prior to the time of Copernicus the Arabian astronomy was dutifully accepted in the West. The astronomy of the Arabists of the Middle Ages was based on Latin translations of the Arabic versions of Ptolemy's *Almagest*, which had been translated into Arabic (c. 870) by the Arab Al-Kindī, and later from the Arabic into Latin by Gerard of Cremona. This work, like those of Aristotle, began to be questioned in the Latin West despite the fact that it was the consummation of Greek astronomy. The astronomical reforms of Copernicus were marred by certain imperfections which we need not go into here; he, however, in his great work *De revolutionibus orbium cœlestium* which was published in 1543, laid the foundation for the subsequent modern experimenters such as Tycho Brahe and Johann Kepler.

The preface to this work is significant; it was composed by Andreas Osiander (1490–1552) whose purpose was to disarm the prejudice of the Arabist and Hellenist disciples of Ptolemy who would, in his opinion, not be prepared to accept the teaching that the earth moved round the sun.

The great representative of the anatomical experimenters was ANDREAS VESALIUS (1514–64) who was a native of Brussels; he studied anatomy under great difficulties, because

of the extravagant admiration in which the Galenic anatomical doctrines were held. While at Padua in about the year 1536, he studied anatomy, and later continued his special work at Pisa and Bologna, so that though a Belgian, he is to be considered as an anatomist of the Italian school.

He completed his comprehensive work *De fabrica corporis humani* at the early age of twenty-eight, and it was published in 1543, i.e. at about the same time as the intimate friends of Copernicus assisted in the publication of his work on astronomy. The anatomy of Vesalius is essentially modern in its outlook, and thus it involved him in troublesome controversies with his Arabist contemporaries. Certain circumstances connected with the dissection of a Spanish *cadaver*, compelled him to go to the Holy Land. On the death of his pupil and friend Fallopius, Vesalius was offered the chair of anatomy at Padua, but owing to a shipwreck and other misfortunes, he died at an early age, in great poverty. This great experimenter who realized that anatomy must begin afresh, aroused much popular ill-feeling owing to his having definitely discarded both the Arabist and Hellenist reverence for Galen; the Arabist and ancient tradition even in some measure affected the great work of Vesalius, for he did not refute the Galenic doctrine of the 'invisible pores' between the two ventricles, though he showed that the septum dividing the two ventricles had no pores, thus acknowledging some deference to the accepted traditions of his day. Vesalius, however, placed anatomy on a solid basis of experiment and observation, and it remained for his pupil Fallopius, and others such as Berenger of Carpi, Eustachius, Nicolaus Massa, Ingrassias, who is said to have skilfully corrected Galen's mistakes, Arantius, Fabricus, and the Englishman William Harvey (ob. 1657), who was a pupil of Fabricius, all of whom fed the fires of the experimental school until it finally supplanted the theories and superstitions of the Hellenists and Arabists who relied entirely on the past for their sources of enlightenment.

Of the experimenters, BERENGER OF CARPI (ob. 1530) claimed to have dissected over a hundred bodies, and in his *Isagogæ* (Introductions) he points out the errors of the pioneer European anatomist Mundinus.

With the publication of the *Anatomy* of Vesalius in A.D. 1543, "mediaeval medicine comes to a close" (Singer), though the Arabist tradition continued to express itself in the teaching of the universities, but gradually gave way to the accumulating force of the discoveries of the experimenters. The development of practical anatomy carried forward the other branches of medical science and led to the relinquishment of the ancient doctrines that had held the Middle Ages in certain well-defined channels of thought and practice. William Harvey in his *De motu cordis et sanguinis*, book x, ch. xiv, p. 68, referring to the circulation of the blood, says *inter alia*, "both argument and ocular demonstration show that the blood passes through the lungs and heart . . . and that it is the sole and only end of the motion and contraction of the heart." This work which was published at Frankfort-on-the-Maine in 1628, shows the final extinction of the fictive anatomy and physiology of the Arabists in Europe.

In the history of medicine, the year 1543 marks an epoch in a more real sense than the year 1494, which is usually assigned to the close of the Middle Ages (cf. Sir R. Lodge's *The Close of the Middle Ages*, 1273-1494, London, 1920). With the publication of the works of Copernicus and Vesalius in 1543, medicine was placed on the rails of original research, and with the fresh increments of first-hand knowledge added by the experimenters who followed, the sciences were revived and the modern period in the history of medicine emerged.

The period of general history terminating in 1494, and of medical history up to 1543, is one of the most important and at the same time most difficult in European history.

In other fields of experimental work, the later Middle Ages produced some outstanding characters. Prior to the time of Copernicus and Vesalius, the scholastics sought to revive the literature and science of the Fathers of Antiquity, their gaze was backwards, but with the advent of the two fundamentally modern works of these two medical men, their minds were directed to Mother Nature.

GALILEO GALILEI (1564-1642) criticized the dictates of Aristotle; his writings which show originality and clarity of thought won him the nickname of "The Wrangler", thus suggesting that the scientific works of Aristotle held a dominant position in Europe during the first half of the seventeenth century, much as they were in the thirteenth. Renan shows that the influence of Averroës, the Arabic commentator of Aristotle, was still clearly traceable in the Italian Universities of the seventeenth century.¹ Galileo was the effective discoverer of both the telescope and the microscope, though the germ of the origin of these instruments of precision has been traced by Singer back to Pliny. It is of interest to note Galileo's work on the "Two Systems of the World"; for having published this treatise he was summoned to Rome and was obliged to recant the doctrine that the earth moved round the sun. His *Sermones de Motu Gravium* consist chiefly of objections to Aristotelian doctrines, which he had no hesitation in denouncing as soon as he was able to demonstrate their errors.

The period following the publication of the scientific works of the two medical men, Copernicus and Vesalius, finds the Græco-Arabic Medicine and Astrology, which up to that time were considered closely allied subjects and a complement of each other, as is seen from the mediaeval almanacs already referred to, gradually being replaced by the work of the experimenters; and from now on the science of medicine was divorced

¹ E. Renan, *Averroës et l'Averroïsme*, 3rd. ed. Paris, 1866.

from astrology, and is further developed under the heads of anatomy, physiology, clinical medicine, and so on. The work of Copernicus undermined the foundations of mediaeval astrology, while Vesalius laid the foundation of modern anatomy, thus affording fresh starting-points in the chronicle of the sciences.

The Modern Era had already received an impulse forward in the latter part of the fifteenth century, from the progressive spirit of inquiry and criticism, the same spirit that broke the authority of the Mediaeval Church; this movement in the medical world was directed against the 'medical pope' Galen, and his servile and subtle followers, the Arabists. With the publication of the work of Vesalius in 1543, anatomy was reborn, though in its infancy it grew with difficulty amidst the matured Arabists whose only opponents hitherto were the Hellenists. The names of the champions of the experimental method in anatomy are perpetuated in such names as *Corpora Arantii*, *Pons Varolli*, and *Eustachian tubes*. The progressive development of verification by experiment and observation eventually brought the fictive anatomy of the Arabists into a state of ridicule, and the knowledge of practical anatomy made great contributions to the advancement of surgery and clinical medicine, to the final discomfiture of the Arabist tradition in Europe.

The stupendous expansion of knowledge that was made possible by the work of the mediaeval experimenters, was so great that its full significance was only very gradually apprehended, with the result that the Arabist tradition continued to thrive long after the year 1543. Arabism, however, did not long stand unchallenged, stubbornly though it held its ground in the deeply rooted orthodoxy of Europe, but was eventually supplanted by the ever-increasing army of experimenters. The other factors in the abandonment of the Arabist tradition in European Medicine and science generally, were the wider outlook resulting from

the discovery of the American Continent, and the enthusiasm for inquiry and criticism evoked by the Renaissance ; the echoes of the clashing of ideas, though long silent, cannot but be of the intensest interest to us who are the *legatees* of a combination of traditions bequeathed to us by doughty European scholars, among whom were the Experimenters, the Arabists, and the Hellenists.

CHAPTER XI

HELLENISM AND ARABISM IN THE FIFTEENTH AND SIXTEENTH CENTURIES

It is known that prior to the fifteenth century the people of Italy had become Hellenized through the literary and artistic tradition which accrued from the influx of Greeks and Hellenized Asiatics, the latter of whom, coming in the first instance as slaves, gradually coalesced with the native elements, so that while the rest of the Latin West was in a state of intellectual darkness, Italy maintained a semblance of culture, which in the thirteenth century was combined with a native renaissance and the influx of the Arabized Hellenism of the Arabians.

It is curious that as pointed out by Sir R. Lodge in his work on *The Close of the Middle Ages*,¹ the two powers which claimed to represent the ancient Empire of Rome perished in the thirteenth century. For the next two centuries, the Eastern Empire which was reinitiated (1261) by the recovery of Constantinople by a prince of Nicæa, showed a bitter hatred for the Romans and the Latins generally.

As has been pointed out in the preceding pages, Greek medicine and culture generally had ceased to spread its intellectual aroma after the fifth century in the Latin West, though the Scots (of Ireland) maintained a steady stream of scholars, and produced many works both in Latin and Gaelic (cf. Sandys' *History of Classical Scholarship*, vol. i, p. 438). With the stream of Arabist medical and philosophical literature in the thirteenth century, and the fresh influx of currents from the Greek centre at Constantinople in the fourteenth, there was a reawakening of interest in the Greek texts.

¹ Op. cit., 5th ed., 6th impression, 1920, p. 494 et seq.

That the Hellenism of the Eastern Arabians and the Western Latins were to clash in the West of Europe, was the ultimate destiny of the ancient culture. With the Renaissance, Hellenism in Europe came as a flood, and the Latin scholastics who had been Arabized and at the same time imbued with a taste for Greek medicine and philosophy, embraced the study of the newly arriving Greek texts, which they translated into Latin direct from the Greek sources.

This new movement led to two great schools in Europe, which may be broadly divided into the Hellenists and Arabists. In the meantime, the school of experimenters, owing to the dogmatic prejudice of the Middle Ages, ploughed a lonely furrow and in the main incorporated the ideas and nomenclature of the Arabists.

Arabo-scholastic medicine continued to thrive in Europe after the rediscovery of the Greek texts, owing to the Arabist modes of thought being deeply rooted in the West.

Hellenism in its purer sense may be said to date from the year A.D. 1443, when Thomas of Sarzana (later Pope Nicholas V) discovered the Ambrosian MS. of the *De Medicina* of Celsus, which had been lost for several centuries; this was the first medical work to be printed, and thus Hippocratic Medicine was not only given a position of precedence but became more freely available to the medical men of the age. It will be remembered that the body of medical teaching had hitherto been passed down through manuscripts, the most of which had been inundated with commentaries, and some of which were none too accurately translated into Latin.

The publication of this work was followed by translations of the *Aphorisms* and other works of Hippocrates, and many other works including those of Galen, Alexander of Tralles, and Paul of Ægina. The printing of these works led to the formation of a school of Hellenists who, as they grew in knowledge and numbers, opposed the Arabist school, which until then had held

the dominant position in intellectual Europe. The opposition between the Hellenists and Arabists was at its height in the sixteenth century, and continued into the early part of the seventeenth century.

The works of Celsus and Hippocrates gradually replaced the Latin translations of the Arabized Galen and Avicenna, though the works of the principal authors of the Western Caliphate (Albucasis and Averroës) still remained dominant in the departments of surgery and in the medico-astrological doctrines that were characteristic of the Middle Ages.

The European scholastics were possessed of a boundless enthusiasm for the newly discovered literature of Ancient Greece, which suddenly unveiled a 'distant past' while the curtains of Arabist texture were torn asunder revealing the fact that the human intellect was capable of possessing capacities hitherto unimagined.

The struggle between Hellenism and Arabism was brought to its height by the publication of the original Greek works of Hippocrates and Galen by the great Aldine Press : these *editiones principes* led to Greek Medicine assuming a dominant position in Medical Europe, while the works of the Arabian writers and the mediaeval commentaries and compilations of the latter sunk to a secondary position. The Arabists still, however, flourished in Italy and England. Janus Cornarius, writing at the Florentine Academy about 1535, says, *Quæ, excusso, Arabicæ et barbaræ servitutis medicæ jugo, ex professo se Galenicam appellavit et profligato barbarorum exercitu unum totum et solum Galenum, ut optimum artis medicæ authorem, in omnibus se sequuturam pollicita est.*

The medical humanists, who were scholars rather than practising physicians, naturally imagined that the revival of Greek Medicine would at once produce the same results as Greek Literature had produced on Mediaeval Literature and Philosophy. These learned men, who were enthusiastic in the cause

of literature and medicine, hoped to expel the evils of barbarism under which they condemned nearly all mediaeval literature.

The great difficulty of the medical humanists was that a knowledge of Greek was confined to a small proportion of scholars, so that their first task was to translate the Greek classics into Latin. This work of translation was undertaken with great ardour, among others by Nicholas Leonicens (1428-1524), Montanus (1498-1552), Gulielmus Copus (1471-1532), Günther of Andernach (1487-1584), Thomas Linacre (c. 1460-1532), Janus Cornarius or Hegenbut (1500-58), Leonhard Fuchs (1501-66), and John Kaye of Caius (1510-72). Rabelais edited some works of Hippocrates and lectured both on Hippocrates and Galen, while Thomas Linacre who was educated in Oxford was acquainted with the original works of Hippocrates and Galen, and his Latin was both pure and correct.¹

The following (sixteenth) century saw the end of the dominating position occupied by the Arabists. A reaction against Aristotelian Scholasticism terminated in Neo-Platonism. The chief means of instruction at the universities at this time was by means of disputations, a method, be it noted, that was customary in the West before Arabian modes of thought had been grafted on to Europe. These disputations were the germs of the present 'University Theses', and assumed important proportions, and both teachers and scholars took part in them. The revival of the philosophy of Aristotle was in part due to the part played by the Arabists who relied on the Latin renderings from the Arabized versions as found in Spain.² With the more free

¹ Freind, *Hist. of Physick*, pt. ii, p. 406.

² NOTE.—The first book printed in Arabic types is said to be a *Diurnael Graecorum Arabum* at Fano in Italy in 1514; it was followed two years later by the *Polyglot Psalter* of Porrus at Genoa, while an *Arabic Vocabulary* appeared in 1505.

Wakefield's *Oratio* (1524) introduces some Arabic words, but it was not until 1635, when an Arabic lecturer was appointed at Oxford, that the Arabic language was seriously cultivated by English scholars. The Raphelangi Arabic Press

circulation of the Latin translations from the original Greek, aided not a little by the efforts of the Aldine Press and the enthusiasm of the Latin translators, e.g. Nicholas Leonicensus, John Kaye of Caius, and the others just mentioned, the Latin versions from the Arabized versions, which were often of poor quality, fell into contempt, but the process was a gradual one.

The increasing number of the Greek originals which had been translated into Latin, and which were being more freely circulated in Europe, led to the rise of a School of Hellenists, who in the sixteenth century bitterly opposed the Arabists; between these two schools of thought there rose a school of 'Conciliators' who rendered a great service to the Middle Ages. The literary output of these conciliators who include Campier (1472-1539), the martyr Michael Servitus (d. 1553), Vallessius (d. 1572), Neustain (d. 1590), Rorario (c. 1572), and Sylvaticus (d. 1621), covers a great mass of literature in which they attempt to reconcile the doctrines of the Hellenists and Arabists.

As was to be expected, in the bitter strife between the Hellenists and Arabists, the former who were proud in the possession of the ancient learning of Greece, referred to the latter as *noetetics*, thereby in one word condemning the Arabist doctrines as newfangled'.

Both among the Hellenists and Arabists we observe the overgrown rule of the subtleties of dialectics; ¹ in both schools Aristotle was the source of philosophy, and both cultivated therapeutics, materia medica, and astrology; as compared to the Anatomical Period of Alexandria, which was one of descent, this era of the Middle Ages was one of ascent.

With the development of the advancing tide of Hellenism in the Latin West, the Arabist system which signally *flouted* reason

of Leyden is said to have been bought by an Englishman and brought to England at about this time; but the Arabic types were not used in Thomas Graeve's *Oratio de linguæ Arabicæ utilitate* (Oxford, 1639), in which the Arabic words were written in by hand.

¹ Baas, *Outlines*, p. 284.

was denounced and rejected, and eventually gave way to the growing strength of the new era which saw the rebirth of the human intellect. The translation of the Scriptures into the living tongues of Europe led to certain secular results, of which the introduction of "Hebraic sublimity and intensity" into the literature of the Renaissance was the most notable, particularly in sixteenth century England. The magic of genius which had worked great miracles in the past, from now on, developed its full capabilities without undue reverence for the past.

With this development the spirit of criticism began to spread. The scholastics of this period may be divided into three groups; the first or sober reformers held fast to all that was good in the old (Arabized) system, while gradually assimilating the new, and included among their numbers the great anatomists and clinicians; the second group were the followers of the *Canon* of Avicenna, and the third consisted of the mystics and chemical or Paracelsic physicians.

The doctrine of the influence of the signs of the zodiac on the human frame was especially favoured by the Arabists, and was still further developed in the sixteenth century by the mystics; astrological calendars were compiled showing the days on which certain treatments and remedies were 'dangerous'. The development of the mystical school of the sixteenth century can be traced back to the writings of Averroës of the Western Caliphate.

The chemical mystics, a more important class, were represented by PARACELSUS (Theophrastus von Hohenheim), c. 1490-1541. To Paracelsus we owe the introduction to medicine of bismuth, zinc, and the salts of antimony.

Paracelsus publicly burnt the works of Galen and Avicenna, and thus showed his contempt of the Arabist school; he also showed a great deal of originality in his description of a 'natural balsum' (the plastic-lymph of Harvey) in the healing of wounds.

It is a signal fact that Paracelsus showed an utter contempt for anatomy.

The revolt of Paracelsus against the prevailing systems of medicine, both Hellenistic and Arabist, contained within it the germs of the scientific truths of modern times. In England 'Paracelctic Medicine' was assailed by the College of Physicians and the Society of Apothecaries of London. Of those in England who were opposed to Paracelsus were FRANCIS ANTHONY (1550-1623) who does not quote Paracelsus, but shows a decided Arabist leaning by his reliance on Arnold of Villanova and Raymond Lulli.

The close of the fifteenth century saw the triumph of the Humanists over the Schoolmen, and the replacement, to some extent, of the works of Aristotle by those of Plato. This emancipation from Aristotelianism opened the way to the revival of mystical Neo-Platonism which, as already stated, resulted in the sixteenth and early seventeenth centuries being occupied in a great controversy between the Hellenists and Arabists, in the growth and development of what came to be known as the "witch mania" and "the extravagances of the astrologers and alchemists" (Withington).

The discovery of the original Greek texts (1443) proved disastrous to the traditional medical doctrines, which were represented in Latin Europe by translations from the Arabic texts found in the South of Spain, and the glosses and commentaries of the Arabist scholastics of the West.

The triumph of the Humanists was no unmixed blessing,¹ for though they led their followers away from the "rusty chains of Galeno-Arabist bondage", they were scornful of 'handiwork' with the result that surgery received no encouragement from them.

As already stated, Averroës, the great 'commentator of the works of Aristotle', was principally responsible for the great

¹ Clifford Allbutt, *Historical Relations of Med. and Surg.*, p. 66.

zeal for astrology in the later Middle Ages ; it should be noted at this point that Averroës knew no Greek and obtained his knowledge of Aristotle from the Arabic translations of the works of Aristotle.

The philosophy of Averroës was compounded of Aristotelianism and Neo-Platonism and, as stated, was the highest point of the battle between faith and reason in Moslem Spain and was passed on to Scholastic Europe by the Jews. The difference of opinion in the sixteenth and early seventeenth centuries was not a little affected by the Averroistic leanings of the Arabists.

The medical mystics combined the Neo-Platonic doctrine of the macrocosm and microcosm with the Christian dogma of " all things being created with a view to mankind " (Withington), in the same way as St. Thomas Aquinas reconciled the doctrines of Galen and Aristotle (as understood by Avicenna) with those of the Church.

Finally, the campaign of the medical humanists against the mediæval and Arabian writers led to the replacement of Avicenna by Latin translations¹ from the Greek text of Galen, and the supremacy of Greek Medicine over the collection of doctrines known as Arabian Medicine in the West. The triumph of Galenism, however, was not complete by the middle of the sixteenth century, but was seen earliest in the schools of Italy and England.

An examination of the surgical works published during the fifteenth and sixteenth centuries is most enlightening. The *Collectio Chirurgica Veneta* published at Venice in 1497, by Bonet. Locatellum Bergomensem, commences as follows : *Guidonis de Cauliaco chirurgia parva, Albucasis Chirurgia, Gesu Haly et Canamusali de oculis . . . Leon. Bertapalia recollectæ super IV canonis Avicennæ*. The Venetian of 1498 contains the surgery of Guy de Chauliac, Bruno, Theodore bishop of Cervia,

¹ Appendix II of this work is devoted to an investigation of the Latin translations of Galen.

Lanfranc, Roger, and *Leonardi Bertapaliæ recollectæ super IV canonis Avicennæ*. Other editions of the 'Collectio Chirurgia Veneta' were issued at Venice in 1499, 1513, 1519, and 1546 (Giunta).

The *Collectio Chirurgia Parisina* (Paris, 1544) begins as follows: *Vidi chirurgia e græco in Latinum a se conversa: cum commentariis propriis et Galeni*, and consists of Latin translations of Hippocrates, Galen, and Oribasius.

Gynæcology and Obstetrics in the sixteenth century is illustrated in the *Collectio Gynæciorum* published at Basle in 1566 and 1586. Book 2 commences: *Ex Albucasis libro secundo methodi medendi capita a 72 ad 78, de ratione curandi aliquot affectus mulierum, etc.* An edition of this collection published in 1597 (Argentor.) commences: *Gynæciorum sive de mulierum tum communibus, tum gravidarum, parturientium et puerperarum affectibus et morbis, libri Græcor., Arabum, Latinor. veterum et recentium quotquot extant partium nunc primum editi, partim vero denuo recogniti, necessariis imaginibus exornati, etc.*

These and other Latin works illustrate the fact that even as late as the end of the sixteenth century, the Arabic works in translation occupied a position of authority among the physicians of Western Europe. Evidence of Arabist doctrines surviving up to the time when the work of the 'experimenters' had wrecked the scholastic attitude of dependence on the writings of antiquity, is not wanting, and will be discussed in the next chapter.

CHAPTER XII

A REVIEW OF EUROPEAN LITERATURE AND THE MEDICAL CURRICULA OF EUROPEAN UNIVERSITIES IN THE LATER MIDDLE AGES

European Literature completed its evolution in Ancient Greece, and in the writings of such writers as Homer, Tyrtæus, Æschylus, Herodotus, Pericles, Plato, and Zoilus, its subdivisions may be studied. Greek Literature may be divided into three stages, the first being from Homer to A.D. 529, when the Schools of Philosophy at Athens and Alexandria were closed by the Christian Emperor Justinian; the second or Middle (Byzantine) Literature carries us to the year 1453, when Constantinople was captured by the Moslems, while the Modern Literature may be said to date from the satirical poetry of Theodorus Prodromus (1143–80) who wrote in the popular dialect. Briefly, the *Old Literature* of Greece, with which we are concerned, may be subdivided into the Early Literature, the Attic Literature, and the Literature of the Decadence, the last of which may be further subdivided into the “Alexandrian Period” (300–146 B.C.), and the “Græco-Roman Period” (146 B.C. to A.D. 529). Since then, we may consider all subsequent literature imitative, for the Roman writers L. Fabius Pictor, Lucretius, and Horace imitated the Greek originals. The downfall of the Roman Empire of the West and the adoption of Christianity as the official religion, introduced a tone of provinciality into European Literature, which, however, did not perish during the “Dark Age”, but assumed a subordinate position to scholarship. Medical literature had been carefully collected in the monasteries, but the promised literary renaissance of the court of Charlemagne

failed to materialize, and not a single masterpiece was produced in the Latin West for five centuries, if we except the two luminous points presented by Boethius and Venantius Fortunatus. The provincial literature, such as that of the Celts and Teutons, shows an elaboration of literary methods which were founded on those of Rome, and therefore of Greece; this literature, however, shows the introduction of legends laden with mystery, a characteristic which had disappeared since the days of Pan.

With the development of new varieties of Romance in the tenth century, they began to be utilized for literary purposes, among which the medical writings took a prominent position.

The versified medical literature, which later grew to enormous volume, obeyed the universal law of literary history by cultivating verse before essaying the writing of prose. It was so in later Greece, was emulated at Rome, and with the rise of Salerno in the early Middle Ages, we observe that European medical literature when it emerges from the long sleep of the Dark Age presents us as its principal work, a book of medical aphorisms in verse (*Flos Medicinæ*).

Early in the eleventh century the literary heritage of Europe began to accumulate in France, and here it was that the Jews of Spain from now on to the fourteenth century added the Arabized versions of Aristotle, Galen, and other of the Greek writers of antiquity. After the fourteenth century the literary sceptre passed from France to Italy owing to the emergence of Dante, Boccaccio, and Petrarch. It was not until the time of Dante, with his *Vita Nuova* (c. 1293), David of Augsburg (d. 1272), and Berthold 'The Sweet' (1220-72), that historical prose came to be used in Germany. In France verse began to be abandoned by the chroniclers about the year 1200, and the earliest prose work in French which is extant is the *Book of Stories*, written c. 1225, while Villehardouin's *The Conquest of Constantinople*, though never completed, contains his biography between 1198-1207, and is a landmark in the history of French

literature. In Spain, Castilian verse is far advanced before there are any definite traces of prose, and the great figure in directing and shaping it was King Alphonso the Learned (1226-84); Toledo looms brightly as a centre for Castilian prose, where Alphonso was helped by subsidiary authors. In England, where an independent tradition dates from the seventh century when the Code of the Laws of King's Inn was issued, Latin ceased to be used as the universal medium of the educated, and in the eighth century translations into the vernacular took place; in the ninth century Alfred, whose *Handbook* is unhappily lost, produced what may be said to be the first example of English prose. At the time of the Conquest, Latin and French took the place of English prose, but there was no real break between the Conquest and modern English prose, which is said to begin with *The Testament of Love*, by a London Lollard in 1584. The period intervening between King Alfred and the London Lollard saw the championship of English prose by John Wyclif, Nicholas Hereford, Capgrave, Fortescue, and others who need not be discussed in this particular work, but those mentioned serve for the purpose of our illustration.

The period during which the literary sceptre was held by France coincided with the growth and high development of the Arabist School of Montpellier, which came under the influence of the Arabized Jews of Spain: Montpellier, owing to its geographical relation to Andalusia on the one hand, and Sicily and the Italian peninsula on the other, combined with its ancient traditions as a centre for medical learning and as a health resort, drew numbers of students from the Latin West, who after having imbibed at the Arabized sources available at that time, once more scattered themselves in Europe, thus permeating the whole fabric of mediaeval culture with the gloss of Arabian erudition. The subsequent teaching of the *alumni* of Montpellier who exercised a dominating influence over medical literature on the Continent and in England, is one of the outstanding historical

facts of the Middle Ages. The newly developing varieties of Romance, combined with the steady inpour of Arabic works from Southern Spain, which were in the main rendered into indifferent Latin, rendered both the liquid languages and sciences (including medicine) peculiarly susceptible to Arabian influences.

Western Islam, with its conquests, glories, triumphs, and spoils, would be of little measure if it were not for its marked influence on the language, literature, and science of Europe. The Arabists displayed a passion for extending the limits of human knowledge, and the great age which corresponds with the introduction of Arabist doctrines (both medical and philosophical) to the Latin West, saw the rebirth of the human intellect in Europe generally, while Spain which was suffering from intestine discords developed a large number of universities from the foundations of the Moslem Schools which were established during the Moorish dominancy of the Iberian Peninsula. The history of the medical faculties of the Spanish Universities which is of interest to students of Spain, is most interestingly discussed by Professor Morejon of Madrid in his *Historia de la Medicina Espanola*. Owing to the political and religious movements in Spain after the Moslem evacuation, the Spanish Universities lacked the Catholicity of sentiment that characterized the other universities of Europe; Seville, the university of which was sanctioned by Julius II in 1505, cultivated Arabic and other Oriental languages; Valencia, which formed a university in 1500, is of particular interest; its history after the decline of the Cordovan Caliphate early in the eleventh century was full of incident, it passed into the power of the Almoravids and later the Almohades, and on its capture by the Christians, in 1238, the new rulers were compelled to translate the Bible into Arabic owing to the large number of Mozarabic Christians who had adopted the language and customs of the Arabs. Though not of direct interest to us, some five centuries

later (1833) some 200,000 Moors or Moriscoes who outwardly professed to be Christians were expelled from Spain.

The development of literature along national lines, combined with the diffusion of Arabist doctrines and the increasing influences of the European Universities, was largely due to the migratory habits of the teachers and scholars. During the later Middle Ages it was no rare experience for Englishmen to expend their youthful energies in *trailing a pike* in foreign lands as mercenaries in foreign armies, and this fondness for travel and adventure exemplifies Shakespeare's "perfect man" who was "tried and tutored in the world" away from his native land. Shakespeare himself is said, though on insufficient grounds, to have trailed a pike on the Continent.

Elizabethan literature, among other sources, abounds with translations from the Spanish, while Shakespeare who died in the same year (1616) as Cervantes, the most illustrious figure in the Spanish Renaissance, was subject to the same influences as the latter (cf. S. Lee's *Great Englishmen of the Sixteenth Century*, London, 1904, p. 380), while Montaigne in France was also subject to the influences of the epoch. Shakespeare, however, was not read in France until translated by Ducis in the eighteenth century. Although English Literature was on the whole refractory to Continental influences, the works of Boileau, Rapin, and Le Bossu after the sixteenth century exercised a certain influence in the reign of Queen Anne.

These brief notes on European Literature are merely given as an introduction to the study of some of the individual works wherein an influence of the contact with the Arabians is clearly shown, and also as a guide as to the inferences to be drawn from the library catalogues and medical curricula of Mediaeval Universities.

CHAUCER (1340-1400), who gives us a graphic description of the life and characters of his time in *The Canterbury Tales*, shows that the medical profession of England during this era

was thoroughly Arabized. Regarding his *Doctour of Phisyk*,¹ he writes :—

With us ther was a Doctour of Phisyk,
 In al this world ne was ther noon him lyk
 To speke of phisik and of surgerye ;
 For he was grounded in astronomye.
 He kepte his pacient a ful greet del
 In houres, by his magik naturel.
 Wel coude he fortunen the ascendent
 Of his images for his pacient.
 He knew the cause of everich maladye,
 Were it of hoot or cold, or moiste, or drye,
 And where engendred, and of what humour ;
 He was a verrey parfit practisour.
 The cause y-knowe, and of his harm the rote,
 Anon he yaf the seke man his bote.
 Full redy hadde he his apothecaries,
 To send him drogges and his lectuaries,
 For ech of hem made other for to winne ;
 Hir frendschipe, nas nat newe to begine.
 Wel knew he th' olde Esculapius,
 And Deiscorides, and eek Rufus,
 Old Ypocras, Haly, and Galien ;
 Serapion, Razis, and Avicen ;
 Averrois, Damascien, and Constantyn ;
 Bernard, and Gatesden, and Gilbertyn.
 Of his diete mesurable was he,
 For it was no superfluitee,
 But of greet norissing and digestible.
 His studie was but litel on the bible.
 In sangwin and in pers he clad was al,
 Lyned with taffata and with sendal ;
 And yet he was but esy of dispence :
 He kepte that he wan in pestilence.
 For gold in phisik is a cordial,
 Therefore he lovede gold in special.

The above lines clearly indicate that during the time of Chaucer, the physician's principal literary authorities were the Arabian writers, among whom Haly Abbas, Janus Damascenus, Serapion, Avicenna, Rhazes, and Averroës, were

¹ W. W. Skeat's edition of *The Complete Works of Chaucer* (Oxford Univ. Press, 1919), p. 424.

prominent, while the Arabized versions of Galen (the Greek originals not having reached the West at that time) and the typically Arabist works of the Anglo-Norman Scholastics Bernard de Gordon (a Scottish professor), John of Gaddesdon (a Fellow of Merton), and Gilbert the Englishman (c. 1290), formed an essential portion of the reading of the medical men of the age.

That this was not confined to England is again evidenced by the inventory¹ of the books left by a canon of Paris in the early part of the fifteenth century; this collection included a part of Avicenna, Isaac Judæus, the *Lilium Medicinæ* of Bernard de Gordon, *Passionarius*, Hippocrates' *Aphorisms*, Rhazes' *Ad Almansorem*, and the works of Mesuë, Averroës, Serapion, John of St. Amand, Gariopontus, Galen, Lanfranc, Saliceto, and a few others. A still earlier list of the volumes belonging to the Faculty of Paris (1395) names twelve, the greater number of which were by the Arabians.²

The medical curriculum at Leipzig at this time included instruction in the *Canon* of Avicenna, Rhazes' *Nonus Almansoris*, and Galen's *Ars Parva*. At Oxford, and other principal mediaeval universities, the medical curriculum which extended over a period of six to eight years, included the *Tegni* of Galen, the *Liber Febri* of Isaac Judæus, the *Antidotarium* of Nicholas of Salerno, and the *Aphorisms* of Hippocrates; for further interesting information regarding medical curricula in the Middle Ages the reader is referred to Ferrari's *Une Chaire de Médecine au XV^e. Siècle* (Paris, 1899).

During the fifteenth century (up to the year 1467), a curious feature was the omission of anatomy from the ordinary medical curricula of European Universities, while the lectures which were delivered in the mornings, afternoons and evenings, included metaphysics, logic, astrology, and rhetoric. In 1467, half the

¹ Baas, *Outlines*, p. 323.

² Franklin, *Recherches sur la Bibliothèque de la Faculté de Médecine de Paris*, 1864.

books mentioned in the catalogue of the Ferrari's library are of Arabian origin. Osler mentions the textbook of Ferrari (1471) which had been circulated earlier in MS.; this work quotes Avicenna "3,000 times, Rhazes and Galen 1,000, and Hippocrates only 140 times".

In the latter part of the fifteenth century the Arabists were dominant at the University of Tübingen (1481), where the course of medical study before graduation included Galen's *Ars Medica*, and the work *On the Regimen of Health*, Avicenna's *Canon*, Rhazes' *Nonus Almanzor*, and Hippocrates' *Aphorisms*; further instruction was given after graduation, on the surgical portion of the *Canon*, Mesuë's *Simple Remedies*, and the *Viaticum* of Constantine the African, which is a book in seven parts that had been translated from the Arabic. This curriculum of the then newly founded university is of especial import, as in view of the interests both of tradition and progress the course of study at the medical faculty was drawn up in complete accord with the generally accepted opinion as to the respective educational values of the medical works extant at that time, all of which is exemplified in the textbook of Ferrari (1471). This list of textbooks is clearly indicative of the supremacy of the Arabists, despite the discovery and printing of the original Greek writings and carefully edited Latin translations therefrom. The great difficulty in the early Middle Ages was the procurement of good MSS. At Montpellier, MSS. of the Arabian authors were comparatively abundant and many 'Compendia' containing Arabist doctrines were issued under the control of the universities, particularly those of Bologna and Padua.

In the latter portion of the fifteenth and in the early part of the sixteenth century the Arabists in Latin Europe were undoubtedly the most influential of the learned members of society, and the demand for Latin versions of the works of the Arabians in general, and Avicenna, Averroës, and Serapion in particular was supplied in a very generous manner by one Andreas

Alphagus Belluensis (d. 1520). Andreas, who like his predecessors was labouring under a weight of contentious commentary, made direct translations from the Arabic texts of the following: Avicenna's *Canon*, *De medicinis cordialis et cantica*, *De anima*, *De Mahad*, *De dispositione seu loco ad quem revertitur homo*, *Aphorismi de anima*, *De diffinitionibus et quæsitis*, and *De divisione scientiarum* (published at Venice in 1546), Averroës' *De Theriaca* (published in the Opp. Aristotelis, 1552, 1560), Serapion's *Practica*, and a number of other Arabic works (see Appendix I).

In the sixteenth century the Arabic pharmacy was translated into the languages of Europe ;¹ this is evidenced by the printed books of the time, e.g. the *Herbal* of Eucharius Roesslin (d. c.1553). It is of interest to note that this work contains reference to such medicaments as 'Hiera picra Rhazis', and 'Pil. alephanginæ Mesuæ'.²

The medical curriculum at Vienna³ in 1520, included the works of the Arabic writers ; while the University of Frankfort-on-the-Oder, after the year 1588, demanded a knowledge of the *Canon* and the *Nonus Almansoris*. At this time surgery was considered an unfit subject for the practitioner of medicine, who was accustomed to stock such articles as spices, wax-candles, paper, and even sweets ;⁴ the demand for the varied and expensive drugs and medicaments that was created by the Arabic poly-pharmacy led to a busy trade between Europe and the East throughout the Middle Ages.⁵

The sixteenth century saw an event that entirely dominated the problems of the time ; this was the discovery of America, together with which we would associate the anatomical work of Vesalius and the astronomical writings of Copernicus who, in

¹ Baas, *Outlines*, pp. 435-6.

² *Ibid.*, pp. 447-8.

³ Puschmann, *Hist. of Med. Education*, p. 240.

⁴ *Ibid.*, p. 252.

⁵ W. Heyd, *Geschichte des Levantehandels* (Stuttgart, 1879), ii, p. 55 et seq.

addition to the work which has brought his name down to posterity, practised as a general medical practitioner and, it is said, held a large and successful practice ; together with these, this was the epoch of Shakespeare in England, Cervantes in Spain, and Montaigne in France, all of whom came under the influence of the time, and show that they were surveying the same problems and philosophy, and offering much the same solution (cf. Lee's *Great Englishmen of the Sixteenth Century*, London, 1904).

An investigation of the medical knowledge of Shakespeare (1564–1616), from the point of view of Arabian influences, is of interest in our present work. As pointed out by Bucknill, Shakespeare was deeply imbued with the best medical opinion of his age,¹ and the only play of Shakespeare which contains no passages referring to medical subjects is *Titus Andronicus*. The following extracts from Shakespeare contain references to Arabian and Arabist medicaments and doctrines.

Of one, whose subdu'd eyes,
Albeit unused to the melting mood,
Dropt tears as fast as the Arabian trees
Their medicinal gum.—*Othello*.

Bucknill says that this refers to myrrh, and not “ the gum of Arabia ”.

The Arabist tradition which crystallized in England in the *Rosa Anglica* of John of Gaddesden, which, however, was never translated into English, can be traced in *Much Ado About Nothing*. Shakespeare puts the following remark into the mouth of Leon, *Where is but a humour, or a worm ?* in a conversation regarding the toothache. On referring to Gaddesden's *Rosa Anglica*, Liber Secundus, “ De febris,”² we find the following : “ De Corrosione Dentium . . . Prima est evacuatio humiditatum . . . Si vermes sint in dentibus . . .”—and this

¹ J. C. Bucknill, *The Medical Knowledge of Shakespeare* (London, 1860), p. 292.

² Ed. 1595, p. 923, cited by Bucknill.

was probably Shakespeare's source for the universally accepted Arabist doctrines regarding toothache during the age. The connexion between the Arabized *Rosa Anglica* of Gaddesden and Shakespeare's *Much Ado About Nothing*, is thus established.

In order to orient our facts, it may be noted that during the sixteenth century, the prominent figures in English history were Sir Thomas More (executed 1535), Sir Philip Sidney (died of wounds 1586), Sir Walter Raleigh (executed 1618), Edmund Spencer (said to have died of starvation in 1599), and Francis Bacon (died in 1626, as a result of a chill contracted while experimenting with the refrigeration of a hen).

The medical faculties of the universities adopted by degrees the works and doctrines of the later experimenters commencing with Vesalius (d. 1564), and from now on we observe the progressive elimination of Arabist writings and practices. Europe awakened to the knowledge that the Ancient Greeks had left a heritage which could be better appreciated without the Arabian tarnish which had hitherto obscured the purity of classical intellectual independence.

An investigation of the medical literature of the fifteenth and sixteenth centuries yields most interesting results, and it is significant that a large number of the published works in the former include Latin translations of the Arabians, while in the second half of the latter century we find that the vast majority of the printed works are Latin translations made directly from the Greek MSS. The latter with particular reference to the Latin translations of Galen will be found in Volume II of this work (see Appendix II), while the former or Arabist group includes the following : *Isagoge Joannitii*, *Philareti 1. de pulsib.*, *Theophilii 1. urinarum*, *Hippocrat. aphorismi cum commentario Galeni ex arab latine verso a Constantino Africano monacho*, *liber prognosticorum (Hippocr.) cum commentario*, *liber de regimine acutor (Hipp.) cum commentario Galeni*, *Galenii microtechnon cum commentario Haly (Rodoam) (1479)* ; John of Ketham's *Fasciculus*

medicinæ (Venice, 1491, 1495, 1500, 1513, 1522), the 1495 edition published by John and Gregory (book i, part vi) contains the whole of the "Anathomia," of Mundinus. The edition published on the 17th February, 1500, contains (part xxxi) *Tractatus Rasis de ægritudinibus pueror, et earum cura qui appellatur practica puerorum*.

The Cæsarian Collection published in 1534 (Argentor.) contains in addition to other matter the following: *Isagoge s. introductio Joannitii in artem parvam Galeni de medicina speculativa*.

Heyll Artificialis Medicatio (Moguntia, 1534) which commences: *Hoc in volumine hæc continentur. Artificialis medicatio constans paraphrasis in Galeni Librum de Artis Medicæ Constitutione, Autore Christophoro Heyll, Mexico*, contains an index of the "Antidotarium" of Mesua and Nicholas.

The *Experimentarius Medicinæ* (Argentor, 1544) is largely on the diseases of women and children, diet and simples (based on Oribasius).

With the *Collectio Aldina* which commences *Medici antiqui*, etc. (published at Venice in 1547), the *Collectio Stephaniana*, which commences *Medicæ artis principes post Hippocratem et Galenum. Græci latinitate donati*, we arrive at the period when the Latin renderings from the Arabic versions of the Greek works are deliberately omitted, and we find the collections of medical literature published, e.g. the *Crassi Collectio* (Basle, 1581) begin as follows: *Medici antiqui Græci*, etc., though the *Rivini Collectio* (Lipsiæ, 1654) contains references to Constantine the African, and the *Halleri Collectio* (Laussannæ, 1769 . . . 1774), entitled *Artis medicæ principes*, contains in volume vii, references to Albucasis and Rhazes' *De variol. et morbill*. Haller, it may be again noted here, was the first of whom we have a written record who used the term "Arabistæ". From now on we must leave the Arabistæ and the gigantic efforts they made to rise from the slough of inertia their predecessors had sunk, for the Arabic versions of the Greek works are no longer published.

Avicenna's influence in the middle of the seventeenth century is seen in the work of Pierre Vattier, a physician of Orleans, who lived between the years 1623 and 1667. Vattier wrote two historical works on the Muslims, one on the pyramids and one on Arabian music, which was a translation from the MS. of Abd-al-Rahman in 1664. We are, however, only concerned with the medical and philosophical which include *Avicennæ de morbis mentis* (1659), which was an attempt to resuscitate certain teachings of Avicenna. Vattier also wrote a work entitled *La logique du fils de Sina*.¹

In the seventeenth century, the tendencies were partly a continuation of the sixteenth, and there was no sharp line of demarcation.² This (seventeenth) century still saw Arabic erudition showing signs of activity, e.g. the work of Charles Patin (d. 1699), Santoro (d. 1635), Calders (c. 1658), Ponce (d. 1650), de Heredia, Kasper Hofman (d. 1658), while Hartman (d. 1707) with his *Florilegium Hippocrateo-Galeno-Chemicum Novum*, saw the last of Arabo-scholastic Medicine in Europe, the final flicker of which is to be seen in the Haller Collection just referred to.

Arabic pharmacy survived the longest ;³ Serapion and Mesuë were consulted up to as late as the beginning of the nineteenth century. Further, in the nineteenth century we find Lister with his modern system of treating wounds (as opposed to the *ælye-surgery* of the Arabists) vociferously opposed by his contemporaries, who still adhered to the methods commonly practised in mediæval times ; while to-day we find the pharmacopœas of Europe and America, are largely founded on the Arabic methods of presentation with their tables of weights and measures,

¹ Steinschneider, *Die europäischen Übersetzungen aus dem Arabischen*, iv, pp. 79-80.

² Baas, *Outlines*, p. 475.

³ See Dietz *Analecta* (Lips., 1833), edited by F. Reinholdus Dietz, "Fasciculus Primus, in quo insunt : 1. Elenchus materiæ medicæ Ibn Beitharis Malacensis secundum codices MSS. Arabicos Escorialensis, Matriensis, Parisiensem, etc."

and their multitudinous medicaments, and such names as *alcohol* and *elixir*, which have been derived from Arabic sources.

The great wave of Arabic learning with its "ground-swell" of Greek and Eastern Culture broke into theory-crested currents in Latin Europe, and the ripples of this most romantic event in the intellectual history of Europe can still be traced in the language of the people, and in that of medical science.

Though Arabic science set foot in varied tracts of knowledge, its fullest development is seen in the field of medicine. Arabic Medicine, *per se*, impoverished itself by its breadth of intellectual ambition, but in its imaginative endeavour it created that concentration of intellectual energy known in Europe as 'Scholasticism'. The Arabs often replaced experiment by wordy eloquence, an attitude that was adopted by the High Scholastics of the Latin West. With the arrival of the new era, the mass of new learning which emerged from the darkness and superstition of the preceding ages was reviewed in the light of 'experiment', and with the sixteenth century we find the gradual submergence of Arabist ideas in Europe; but the succeeding centuries had to be enlisted in order to co-ordinate this great mass of discovered knowledge which eventually brought us to Modern Times.

With the growth and development of Modern Medicine, we see the Arabized Medicine of the Middle Ages held in inverse ratio of esteem among the scholars of Europe. The Arabic medical works which had served the purpose of severing the science of medicine from theology and of creating a taste for Greek Culture, survived as a definite part of the medical system of Europe long after they had served their usefulness. Freind in his *History of Physick*, writing in the middle of the eighteenth century, says that he assumed that it will not be supposed that he read the Arabic Authors for the purpose of learning Medicine, thus indicating that the Age of Arabian Dominancy in the Western Intellectual World had definitely passed into the romance of history.

CONCLUDING PARAGRAPH

The knight, the monk, and the Arabian physician march back into the pages of history, to return only to the earnest scholar who will patiently seek for them by emulating the Mediaeval Scholastic in devoting his leisure to such strenuous pleasures as the researching of Mediaeval MSS. and books. The intellectual colour and atmosphere of the Middle Ages affords an expansive field for pleasurable adventure, while the mental history of the Western Caliphate from the seventh to the thirteenth century reads like one great romance which is full of incident and experience; the story of the subsequent Arabic Domination in the intellectual history of Latin Europe is of more than academic interest. Looking back from the vantage ground of A.D. 1925, we are tempted to look upon the Middle Ages as one of ignorance, superstition, bigotry and lawlessness, while fighting and religion occupied the whole attention of the great men of those ages, and standing amid the galaxy of the great leaders of the misty past, we see the great figures looking down upon us from the visor of the knight, and the cowl of the monk. But the Arabist tradition of Mediaeval Europe brings to our minds yet another figure, that of the Arab physician-philosopher with his gold and silver brocaded turban and his halo of intellectual curiosity and broad tolerance, and who are they amongst us who would place him among the least of these ?

